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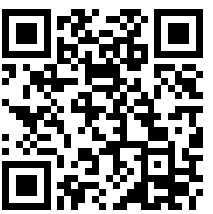

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THE RAILWAY MAGAZINE.

GREAT NORTHERN RAILWAY 3-CYLINDER 2-8-0 MINERAL ENGINE.

Designed by Mr. H. N. Gresley and built at Doncaster Works.

Fitted with the Robinson Superheater, and equipped with Wakefield Mechanical Lubricators for cylinders, valves and axle boxes.

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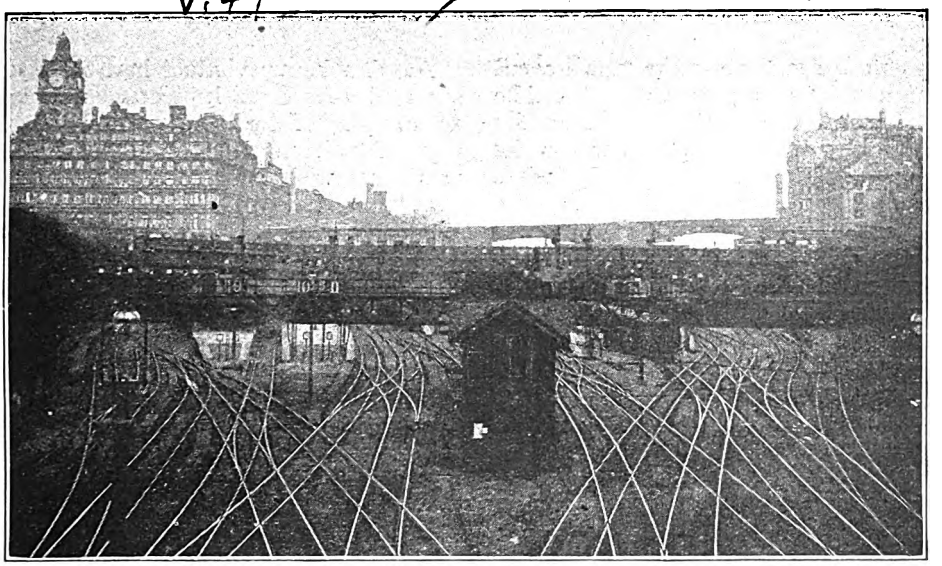

WAVERLEY STATION, EDINBURGH.

North British Railway's Edinburgh and Glasgow Main Line.

By FREDERICK STOTON.

THE North British Railway's main line between Edinburgh and Glasgow, *via* Falkirk, a distance of 47¼ miles, at the present day accommodates a greater volume of traffic than perhaps any other portion of the parent system. It came into possession of the North British Company when in 1865 they took over the undertaking of the old Edinburgh and Glasgow Railway, and it may very truly be said that but for this amalgamation the North British could never have aspired to the premier position which it now holds north of the Border. Not only did the acquisition of the Edinburgh and Glasgow main line obtain for the North British direct independent communication of their own between the two cities, but it gave them a base on which to consolidate their whole system, and from which to construct the numerous extensions by which they afterwards obtained access to the rich and populous districts of the Clyde and West of Scotland.

The original Edinburgh and Glasgow Railway was opened on 18th February, 1842, about three and a-half years after the Act authorising its construction received the Royal Assent, and two years prior to the incorporation of the North British Company's original undertaking. The line extended from Queen Street Station, Glasgow, to Haymarket Station in the West of Edinburgh, a distance of 46 miles. It was not till July, 1844, that another Act was obtained which enabled the line to be carried forward to the North Bridge, Edinburgh (now Waverley Station), and this extension was brought into use in 1847.

The construction of the Edinburgh and Glasgow main line was carried out before the climbing power of locomotives had been discovered, and at a time when the prevailing idea appears to have been that railways to be worked by means of ordinary locomotives had, as far as possible, to be made entirely on the level. The result was that this line was made practically level between Haymarket and Cowlairs, the grade being 1 in 600, and even at the present day it is unrivalled in the superiority of its gradients. It is said the mode of procedure followed was

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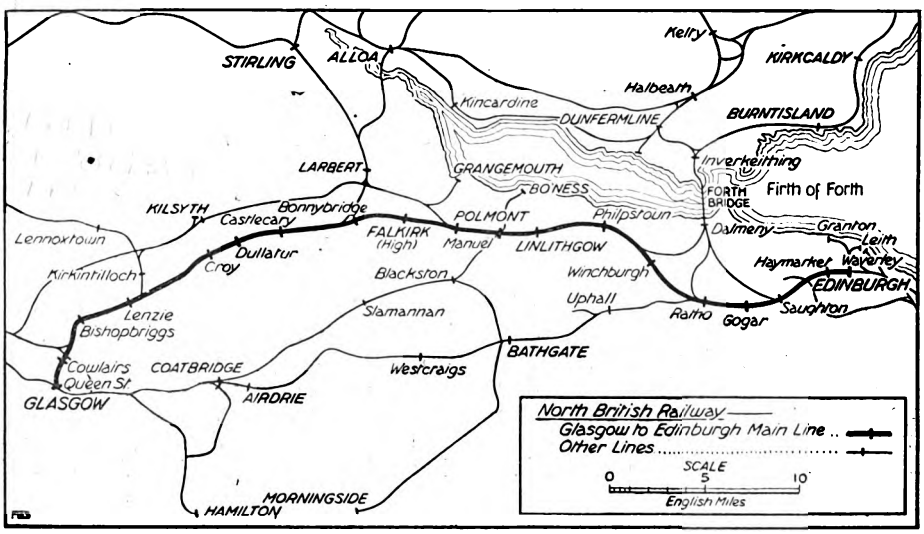
to lay the line in the same way as a canal —that is with as long a stretch as could be on the level, and then the steep descent for the last mile and a quarter down to the terminus at Glasgow. Consequently, while a very fine line was obtained for the most part of the way, the railway was saddled with the cumbersome and expensive method of cable working which was in operation on the famous Cowlairs Incline for upwards of 64 years, and was only discarded in November, 1908. The level line and then the steep grade, of course, resulted in the cost of construction being immensely increased, and involved a vast amount of deep cuttings, huge embankments, long tunnels, and immense

Another heavy viaduct had to be constructed near Falkirk in connection with the carrying of the line over the Forth and Clyde Canal, and the execution of the work was beset with many difficulties, mainly owing to the opposition of the Canal Company, then a separate undertaking. One of the spans is of an extraordinary character, as it embraces the road leading between the head of the Union Canal and Lock 16 on the Forth and Clyde Canal, together with the former canal itself, which is crossed obliquely. This arch, with a span of 150 ft., and a rise of only 24 ft. 6 in. in segment, was at the time of its construction the largest stone arch in Great Britain of so low an elevation, the



viaducts and bridges. Perhaps the most important feature of these works—works which even with present day engineering would be considered of great importance—was the building of the Almond Viaduct, with its 36 arches, some of which are 90 ft. in height. This massive structure is upwards of five-eighths of a mile in length, and is flanked by an embankment more than half a mile long at each end, that at its western extremity being 90 ft. in depth, and requiring half-a-million cubic yards of earth for its formation. The viaduct itself, which carries the line over the River Almond, is built throughout of stone, containing 1,105,000 cubic ft. of substantial masonry, and the whole undertaking cost about £130,000.

weight of the arch stones alone being upwards of 2,000 tons.

Ten miles to the west of Falkirk is the huge cutting through the Hill of Croy. This is another gigantic work, as will readily be understood when it is stated that it is upwards of a mile in length and 70 ft. in depth, being formed entirely through solid whinstone. There are five tunnels on the line, totalling nearly two miles in length, the most notable being on the Cowlairs Incline, extending for 999 yards for the most part under the streets of the City of Glasgow. When the Edinburgh and Glasgow Railway projected their line to Glasgow in 1835 they intended having their Glasgow terminus on a high level. The Forth and Clyde Canal Company,

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whose interests were at that time paramount, opposed the project, and the railway company, to disarm their opposition, consented to go below the canal instead of above it, thus rendering necessary the construction of the long tunnel and the incline down to Queen Street Station. The Canal Company professed to have the intention of joining with the Monkland Canal to form a ship canal, and based their opposition on the plea that the railway, by crossing the canal on a bridge, would render their scheme impracticable.

It is interesting to note in passing that the first steel rails to be used in Scotland were laid on the Edinburgh and Glasgow Railway in the year 1864.

At Cowlairs, near Glasgow, are situated the chief locomotive works of the North British Railway. This great railway centre has been considerably extended from time to time since the opening of the Edinburgh and Glasgow Railway, and it is now on so gigantic a scale that it would require not only one article, but a series of articles, to give an adequate description of it. Some idea of the magnitude of the locomotive workshops may be obtained when it is stated that in normal times they employ between 2,300 and 2,400 skilled workmen. The works are of the most up-to-date description, and are able to cope with the building and turning out in a finished state of the largest types of locomotives and carriage and wagon stock. To the north, at Eastfield, is situated the company's largest locomotive running depot, which was opened in September, 1904. This depot is laid out on the most modern lines, and the adequacy of the accommodation provided, which enables the largest types of locomotives to be dealt with, can perhaps best be understood by a reference to the illustration showing the general view of the depot. At Cowlairs is also found a finely-equipped carriage cleaning shed, fitted with a complete installation of vacuum cleaning plant and other appliances to enable whole trains to be dealt with. In addition, Cowlairs is also the site of the huge buildings in which is housed the railway's Stores Department. At Polmont Junction to the west of Falkirk, and at Haymarket, near Edinburgh, are two other Edinburgh and Glasgow main line locomotive depots. The Polmont depot is the most modern on the system, being opened

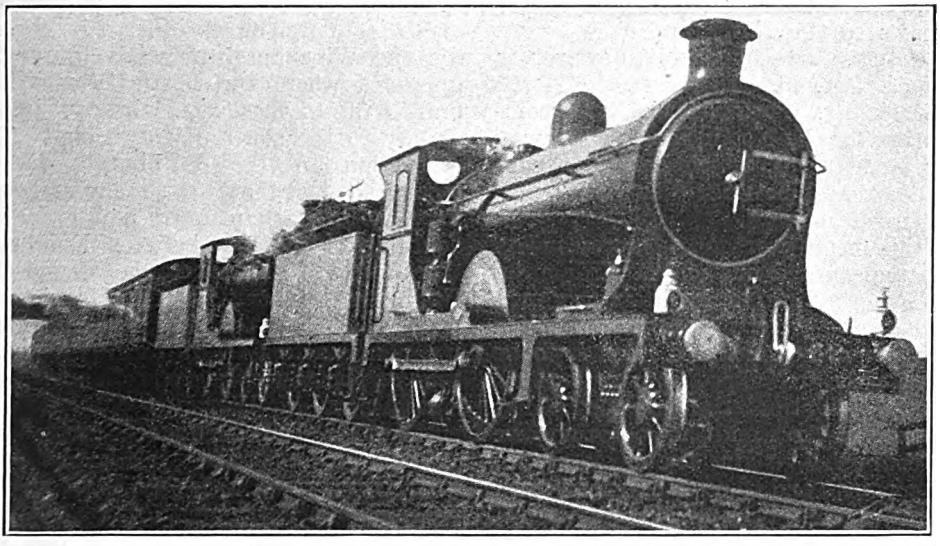

Photo.] [*I. Cheyne.*

GLASGOW-EDINBURGH EXPRESS TRAIN.
4-4-0 locomotives No. 362, "Ravenswood," and No. 561.

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so recently as April, 1915. It consists of a commodious engine shed, coaling stage, water tank, turn-tables, &c. The shed has five roads, each of which can accommodate four of the largest type of "Atlantic" locomotives at the one time, and under each road a pit stretches for the entire length. In normal times about 40 engines in all are attached to the depot. The depot took the place of that formerly at Bo'ness Junction, and its construction involved an expenditure of approximately £20,000. Haymarket depot is of considerable importance, and owing to its close proximity to Waverley, it is the home station of many of the well known named locomotives which work the important expresses to the North and West. The chief interest attaching to it, however, is the fact that, in addition to the North British engines, it provides stabling accommodation for the North Eastern Railway. giant locomotives, which haul the East Coast expresses between Newcastle, Berwick and Edinburgh.

Within recent years many improvements have been carried out on the Edinburgh and Glasgow line to facilitate working, and to enable the greatly increased traffic which is now concentrated upon it to be satisfactorily and expeditiously handled. Since the "eighties" the development has been very marked, and the company have been compelled to give the whole matter their constant and close attention in order that the greatest possible efficiency might be obtained in working. The traffic—passenger, goods and mineral—has increased to an abnormal extent, and has only been coped with by the adoption of a bold and progressive policy which has involved the carrying out of many ambitious schemes and the frequent reorganisation of working arrangements.

The opening in 1886 of the Glasgow City and District line was one of the earliest schemes to be carried out, which had the effect of relieving the congestion on the Edinburgh and Glasgow main line. From High St. East Junction the line extends to Stobcross Junction, with a branch to Hyndland, and forms a link between the Bathgate line on the one hand and the Helensburgh, Balloch and Clydebank branches as well as the West Highland line, on the other. Although only 1 mile 63 ch. in length, its construction involved engineering works of gigantic description, as it is for the most part tunnelled below the streets of the City of Glasgow. Its completion afforded much-needed relief to traffic on the Cowlairs Incline, then worked by means of the cable system, as it enabled a large number of passenger trains running into the High Level Station at Glasgow to be diverted *via* the old City Union line to Queen Street Low Level Station. The line has never been made use of for merchandise traffic.

On the opening of the Forth Bridge in 1890 a very heavy additional traffic was diverted to the Edinburgh and Glasgow main line, between Edinburgh and Saughton on the one hand, and between Glasgow and Winchburgh on the other. At Saughton and Winchburgh respectively are the junctions where the Forth Bridge lines branch off to meet at Dalmeny, immediately to the south of the bridge. The congestion in the Edinburgh district became so great that it was found necessary to apply for Parliamentary powers for the doubling of the line between Edinburgh and Saughton, as well as the Mound and Haymarket tunnels through which it passes. The requisite Parliamentary sanction was obtained in 1891 at the same time as the works in connection with the enlargement of Waverley Station were authorised. The whole scheme, which was of gigantic proportions, involving no less than 1,133 yards of tunnel work for the new double line, was completed and brought into use in 1893. Not only was the stress of traffic working on the Edinburgh and Glasgow line immediately relieved, but at the same time four sets of rails were made available for use by traffic to the west or to the north as occasion demanded.

From a goods traffic working point of view the opening in October, 1901, of Cadder Yard, near Lenzie, was an event of considerable importance. For a number of years, previously, the congested state of the North British Railway's Glasgow Goods Stations, particularly Sighthill, College (now High Street) and Queen Street had been a source of trouble alike to the traders and the Company, and while from time to time extended accommodation had been provided at these points, very little appreciable improvement had been effected in the working, as owing to the steady and

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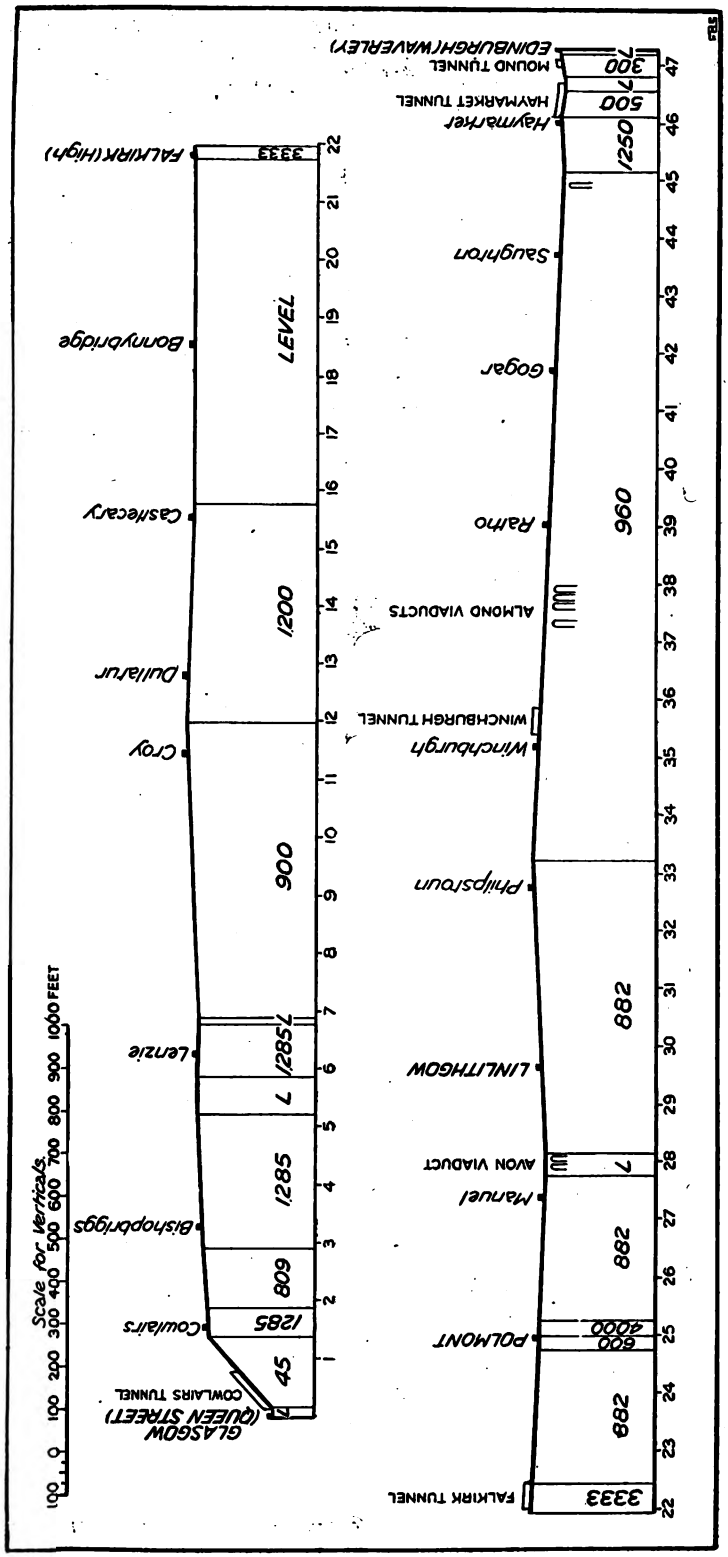

NORTH BRITISH RAILWAY GRADIENT PROFILE.

Main Line between Edinburgh (Waverley) and Glasgow (Queen Street) via Falkirk.

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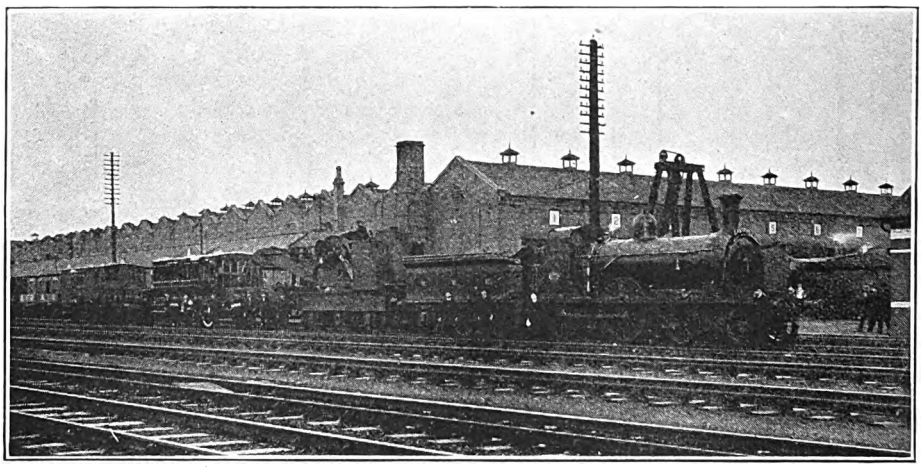
constant expansion, the relief afforded had been absorbed by the growth of traffic. The threatened deadlock in working had become so serious that the Company had no alternative but to consider the provision of some means of relief. The solution agreed upon was the laying down of a large depot in the vicinity of Glasgow, to which wagons could be run at intervals for marshalling purposes, and the Cadder scheme was fixed upon. The yard is situated between Bishopbriggs and Lenzie at a point about five miles from Queen Street High Level Station. The original scheme provided for three yards in all. The main part of the scheme was completed in the first instance. It is laid out in what is known as the "gridiron" or "hump" principle, and to a great extent on the same lines as the London and North Western Railway's Edge Hill Yard at Liverpool. It was constructed with a view to the greatest possible saving of engine power in connection with the marshalling operations. The wagons, in train loads, as they arrive, are run by the pilot locomotives up the inclined plane, which has a grade of 1 in 100, at the west end of the yard, and braked. The locomotive then descends, and the wagons being released, one or more at a time, travel down by means of their own gravitation. On arrival at the points, they are diverted to the appropriate siding in the tantail of lines, each accommodating 50 wagons, which radiate from the bottom of the plane.

Considerable extensions were made at Cadder Yard in the beginning of 1914, and these enabled certain alterations in working arrangements to be adopted which effected a radical improvement in the goods train working both on the Edinburgh and Glasgow line and at the Glasgow Goods Stations. It had previously been the practice to book the goods trains to terminate at one or other of the big Glasgow Goods Depots, notwithstanding that traffic might be carried for several of the other terminal stations. The altered arrangements, however, now enable these trains to be run first to Cadder Yard, where they leave off traffic for stations other than the booked destination of the train, and then continue their journey partly with what they took to Cadder and partly with what they picked up there as a result of the sorting process. In addition the improved working arrangements have enabled several of the goods trains running between the East and West to perform one trip each way per day which was, of course, quite impracticable under previous conditions. In some instances the trains now start from and terminate at Cadder, and, in addition to the booked workings, train and trip engines lift traffic from the reception sidings as occasion demands,



EASTFIELD LOCOMOTIVE RUNNING SHED, NEAR COWLAIRS.
The break-down crane illustrated has a lifting capacity of 20 tons.

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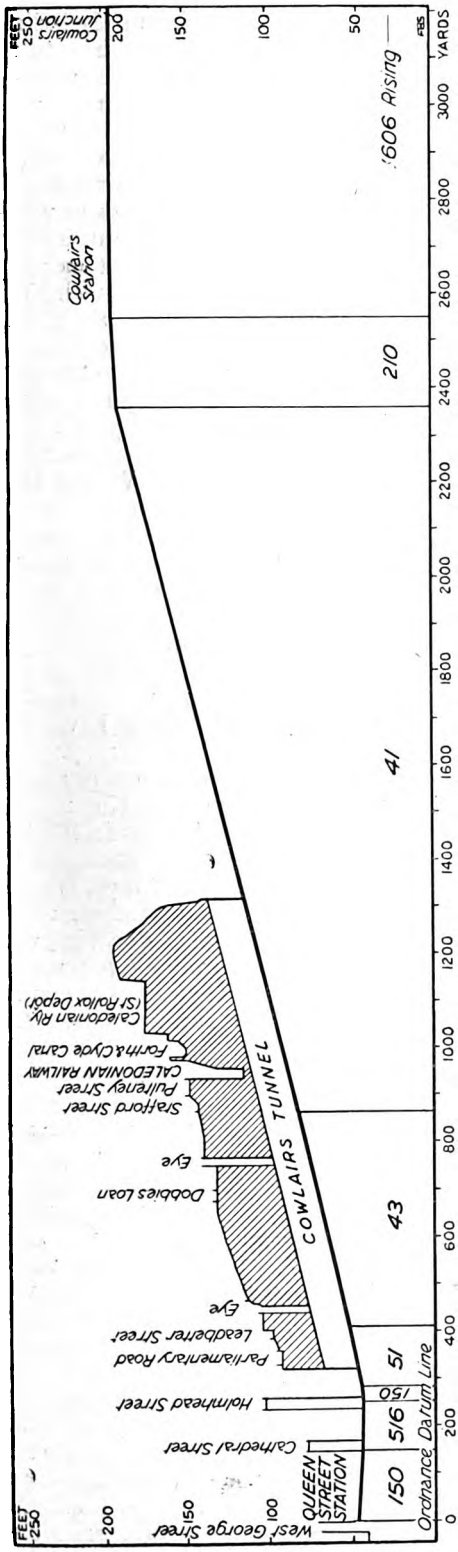

THE FAMOUS COWLAIRS INCLINE.

and run it forward to the various destinations in the Glasgow district. Cadder Yard at the time of opening was the largest marshalling and shunting depot in Scotland, and the carrying out of the extension referred to assured its occupying this unique position for many years to come.

Further relief to the Edinburgh and Glasgow main line was obtained by the completion of the heavy works involved in the widenings carried out between Polkemmet and Woodend, and between Caldercruix and Westcraigs, which were brought into operation in 1904 and 1905 respectively. These works, which completed the doubling throughout of the North British Railway's route between Edinburgh and Glasgow, via Bathgate, Airdrie and Coatbridge, were carried out with a view to make further provision for the immensely increased traffic passing between East and West. Their completion enabled several through goods trains to be transferred to the Bathgate route, thus easing the pressure on the main line via Falkirk.

A further scheme, carried out with the main view of affording relief to the already over-taxed Edinburgh and Glasgow main line, was the provision of the immense new goods station at High Street, Glasgow. The old goods station was considerably altered, and a spacious goods warehouse built—one of the most commodious and best-equipped in the kingdom. The huge pile of buildings has accommodation for dealing with an immense general goods traffic, and for storage purposes. The warehouse, 499 ft. long and 315 ft. in breadth, consists of three floors, with a basement which is considerably extended by arched vaults. The floor on the rail level is laid out as a goods loading shed with tables and rails alongside, giving accommodation for 160 wagons. A very complete electrical equipment has been installed for the handling of traffic, comprising electric cranes of various types, &c., and the provision of electric traversers and capstans avoids the necessity for locomotives entering the building. In connection with the last-mentioned scheme, the line from Parkhead Junction to High Street was widened so as to accommodate four sets of rails instead of two as formerly and as the new line passes through a very deep cut in a busy part of the City of Glasgow, its construction involved some

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very heavy works, as well as the erection of several immense retaining walls. The widening greatly facilitated the working of both passenger and goods traffic in the Glasgow District, and enabled the considerably increased traffic, which had been diverted over it to the new goods station, to be worked promptly.

Perhaps the most important and interesting alteration on the line from a working point of view was the discontinuance of the cable system on Cowlairs Incline. Queen Street, where the main congestion was felt, was always a difficult station to work owing to its cramped and confined situation in the heart of the City of Glasgow, and while any appreciable extension of its area was impossible, the immense growth of traffic made it incumbent that something should be done to improve matters.

When the incline was first opened there were only about a dozen trains a day to be dealt with, but with the gradual development of traffic and the limited capacity of the line under a cable system of working, which required a much longer interval between trains than in the case of ordinary locomotive haulage, it was necessary to make such alterations as would provide for the increased traffic. The result was that an experiment was made of working the trains by means of their own engines, and doing away entirely with the incline brake trucks which were formerly attached to all trains ascending and descending the incline. The experiment was so successful that it was decided to scrap the antiquated cable system, and introduce working as an ordinary line of railway.

From Cowlairs the incline, at a grade of 1 in 45, extends to Queen Street Station, a distance of 1 mile 450 yards, and the summit is 150 ft. above the level of the latter station. With the exception of about three years from 1844, when trains were hauled up the incline by means of specially constructed locomotives, the cable system was continuously in operation until it was discontinued in 1908. The incline was originally worked by means of a hempen rope, but owing to climatic conditions, &c., it did not work satisfactorily. Four exceedingly powerful locomotives (two of which were appropriately named *Samson* and *Hercules* respectively) were specially designed and built to undertake the work of assisting trains up the incline. These monsters—the first engines to be built at the famous Cowlairs works—played havoc with the permanent way, which was then of a light make, as well as with the tunnel, notwithstanding that special iron plating had been fixed on the roof to protect it; and the excessive vibration also had the effect of causing the Forth and Clyde Canal to leak at one place where it is carried over the tunnel. The locomotives were accordingly abandoned in favour of the original system of haulage, a metallic rope, however, being substituted for the hempen one previously in use.

The wire rope, which was 5 in. in circumference, was all in one piece three miles long, and weighed 25 tons. Worked by a stationary winding engine housed at the summit of the incline, the rope for the whole distance was carried over pulleys fixed between the rails about 20 ft. apart. The speed of the rope was 12 m.p.h., and the train took about 8 min. to ascend the incline. In connection with trains ascending; as soon as the trains were placed in position at Queen Street High Level Station at the departure platform, two or more heavy brake trucks of a special design were shunted on to the rear in charge of brakesmen. The train locomotive was then attached to the endless cable by means of a "messenger" rope, and the signal to start was given by bell communication to the signalman at Cowlairs, who in turn caused a steam whistle to sound in the stationary engine house. On hearing the whistle the engineman started the winding engine, and the train then began to ascend aided by its locomotive. One end of the messenger rope was divided into two parts, each of which was twisted firmly round the endless wire rope, while the other end was attached to the front coupling of the train engine, which was provided with an inverted hook. A dial was fixed in the stationary engine house on which the progress of trains up the incline was automatically indicated by the revolutions of the winding engine, and when the pointer reached the proper place, the engineman shut off steam and stopped the cable. As the locomotive was then in full steam on the level, the incline rope at once slackened and so allowed the messenger rope to drop from the inverted hook. At the same time one of the brakesmen dis-

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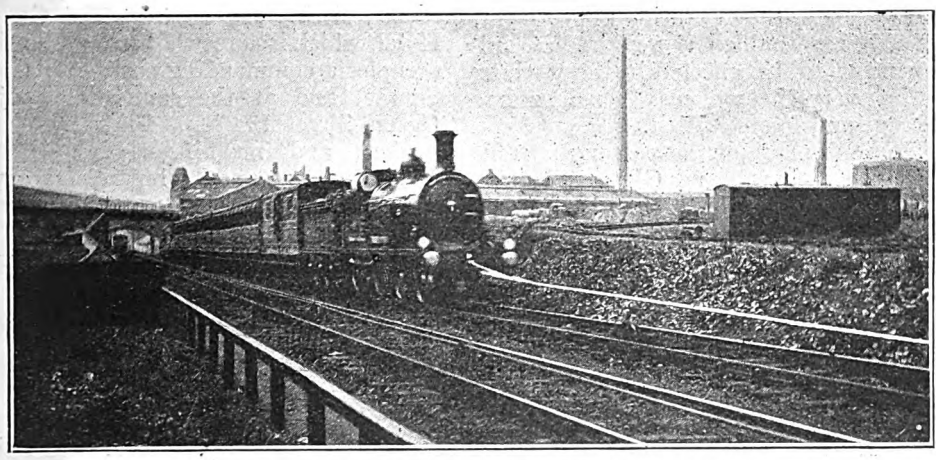
connected the slip coupling of the brake trucks at the rear, and the train steamed on as if it had come up the incline unaided. The rope was not used going down as all trains descended by gravitation, regulated entirely by the brakesmen, who travelled in the brake trucks attached to the front of the train while tickets were being collected at Cowlairs. The winding engine, from its installation in 1842, continued to run daily so long as the cable system was in operation, and some of the original parts were in use when it stopped work. The cylinders were originally 30 in. in diam. but were subsequently altered to 36 in. in diam. by 6 ft. stroke. The valves were cast iron of the piston type, 10⅝ in. diameter, and the engine developed 650 H.P., consuming about 70 tons of coal per week. The rope cost £488, and its average life was about twelve months. To provide steam for the engine there were seven Cornish type steam boilers six of which were in constant use. The old engine house has been preserved, and the main portion is fitted up as a switch room for the electric power, now made use of so extensively in the adjoining locomotive workshops.

After the cable working had been done away with, certain improvements in the lines at Cowlairs Station were carried cut in the vicinity, and to admit of this there had to be demolished one of the most cherished relics of by-gone railway days, viz.: the old signal cabin near the top of the incline, which, although out of use, had long been preserved on account of the great interest attaching to it. It was supposed to be the first signal box to be erected in Scotland, *i.e.*, the first building from which the points and signals were worked together, in place of using the old "balls" still seen in some shunting yards.

A heavy tax has for long been put upon the North British Company's Edinburgh and Glasgow main line by the Caledonian Company exercising their running powers between Haymarket West Junction and Polmont Junction (for Larbert), a distance of over 20 miles, in connection with their North traffic. By the North British and Edinburgh and Glasgow Railways' Amalgamation Act, 1865, the Scottish Central Railway obtained certain running powers and facilities which applied to the Caledonian Railway on their taking over the former line. Under these powers the Caledonian at once began to work their North traffic over the North British line between Edinburgh (Waverley Bridge and Haymarket Stations) and Larbert Junction. In 1874 the Caledonian Railway obtained Parliamentary sanction for the construction of a short connecting line from Dalry Junction, on their Edinburgh and Carlisle main line, to a point on the North British Railway's Edinburgh and Glasgow main line at Damhead (now Haymarket West Junction). They were thus enabled to make use of their own terminal station in



PASSENGER TRAIN ASCENDING COWLAIRS INCLINE ASSISTED BY MEANS OF AN ENDLESS ROPE.

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Edinburgh for their running power trains to and from the North.

The extension within recent years of the system of train control to the Western District of the North British Railway, with headquarters at Coatbridge, is another innovation which has enabled a very marked improvement to be made in the working of the Edinburgh and Glasgow main line. The system has so far been installed between Glasgow and Greenhill, and will be completed throughout as soon as the abnormal conditions presently existing admit of this being done. All shipment traffic, as well as the charge of certain of the large goods yards such as Sighthill, Queen's Dock, &c.—formerly under the supervision of the Goods Department—have been transferred to the new Train Control under the Operating Department, and this has enabled a very radical improvement to be effected in the working of the very heavy coal consignments passing from East to West.

The lion's share of the passenger traffic between Edinburgh and Glasgow has all along fallen to the North British route via Falkirk, and nothing has been left undone that could be done to encourage and maintain it. Within recent years a very fine type of vestibule corridor carriage stock has been introduced on the line, and in normal times a service of 19 or 20 trains per day each way is given. In 1842 the fastest train performed the journey between Haymarket and Queen Street, a distance of 46 miles 9 ch. in 135 min., and in 1846 the time occupied between these two places was reduced to 90 min. Now, the fastest train between the two cities is booked to do the 47¼ miles in 63 min., and keeping in view the restricted speeds presently in force, including that in operation on Cowlairs Incline, the booking is a highly creditable one.

No reference to the Edinburgh and Glasgow main line or its passenger traffic would be complete without a word or two regarding the palatial hotels which have been constructed by the North British Railway in the two cities. The Edinburgh Hotel is centrally situated in the very heart of the city, adjoining Waverley Station, by which it is connected by private stairways and electric elevators. With its magnificent clock tower 248 ft. in height, it is one of the most imposing buildings in the northern capital. Some idea of the magnitude of the structure will be realised from the fact that there are 257 bedrooms in the hotel, as well as public and reception rooms, sitting rooms, &c. The Glasgow Hotel, which is somewhat less pretentious, occupies a commanding position in George Square, and at the same time adjoins Queen Street Station. These hotels are modern and magnificent in all their appointments, and compare favourably with the finest hotels in the country. From the hotels the dining and tea rooms at the principal stations and the restaurant cars are now managed, and the result is a greatly improved catering service to the travelling public.

In the North British Railway Directors' Report to the shareholders in 1865, the "Amalgamation" year, it was stated that "the whole character of the North British Railway had been regenerated by the incorporation of the Edinburgh and Glasgow and Monkland Railways within its system," and no statement could have proved to be more correct in the light of future years.

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Locomotive and Train Working in the latter part of the 19th Century.

THE LONDON, BRIGHTON & SOUTH COAST RAILWAY. [No. I.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

FROM its inception the Brighton Railway has been a popular line, chiefly, it would seem, for two reasons, one of which is that it passes through some charming scenery and serves some very nice watering places on the south coast, and the other that, during the period, of which I am writing, then produce more chaotic unpunctuality than could be found anywhere, except perhaps on the South Eastern. Luckily the geographical position of the Brighton line limited the length of the journeys. Had the company had to deal with a longer main line, it is just conceivable that some of their 19th century trains might just be

Photo] [*Locomotive Publishing Co., Ltd.*

0-6-0 (TERRIER) TANK ENGINE No. 40 Brighton.

Wheels, 4 ft.; cylinders, 13 in. by 20 in. Built at Brighton Works, 1878.

its locomotives were painted a striking yellow colour, and nearly all rejoiced in the possession of names; moreover, the engines were then kept beautifully clean and well groomed. But truth compels me to say that I do not think that the denizens of the London Bridge offices contributed very greatly to its popularity; they were a cheerful band of railway sinners, more especially those connected with the traffic department, and between them they could arriving at their destinations to-day. Moreover, the best trains were for first class, or first and second class passengers only, and the poor third class traveller generally had a benighted time.

Before dealing, however, with the main line trains, the local services in the London district may be more conveniently mentioned. Mr. Stroudley recorded that of 450 miles of railway, no less than 90 miles were within the metropolitan area. These

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STROUDLEY'S STANDARD 0-4-2 D-CLASS TANK ENGINE, No. 20, Carshalton.
Wheels, 5 ft. 6 in.; cylinders, 17 in. by 24 in. Built, 1873–1887.

form an intricate network of suburban lines of the most complicated description, and it is but fair to add, contributed, to some extent, to the unpunctuality of the passenger services, owing to difficulties in working. Such difficulties were nevertheless considerably reduced by the adoption of "flying junctions," of which there were more on the Brighton line, in the neighbourhood of London, than anywhere else, I should say, in the world. The Brighton authorities were, I believe, the first to adopt these junctions, and every credit should be given to them for their far-sightedness. They were introduced many years ago before the traffic had become as heavy as it is now, and it would be an absolute impossibility to conduct the services to-day without them.

The Brighton local lines may be likened to a double spiders' web, in which railways radiate from the two termini of London Bridge and Victoria, and are connected with each other by a series of circular loops.

Three of these loops form the routes between London Bridge and Victoria, viz., the inner, or South London, via Peckham Rye; the middle, via Penge and Crystal Palace; and the outer, via Norwood Junction and Thornton Heath. The inner line was usually, though not always (especially in late years), worked by Mr. Stroudley's celebrated little tank engines with six coupled wheels—the "Terriers" or A class. These engines also worked the East London railway through the Thames tunnel from New Cross into Liverpool Street (Great Eastern), a line which was at one time worked, I believe, entirely by the "Brighton" engines, though their bright yellow colour could hardly be considered as particularly suitable for the smoky atmosphere of the line between Deptford Road and Liverpool Street.

Passenger tank engines with six wheels, coupled, were somewhat unusual in the "seventies," though Mr. Stroudley was by no means the first locomotive engineer to employ this type of engine on passenger trains. The Lancashire and Yorkshire had used 0-6-0 tank engines, specially built for passenger work, from 1856, and the North British had a considerable number of similar engines designed by Mr. Wheatley, and constructed at Cowlairs between 1868 and 1873. Both of these classes were, however, larger engines than the Brighton "Terriers." The South London line at that time was laid with a very light permanent way, and was not in good order, so that a small and very light, engine was a necessity. The A class illustrated on page , had 13 in. by 20 in. cylinders, 4 ft. coupled wheels, wheel base 12 ft., and a total heating surface of 506·16 sq. ft. The total weight was 24 tons 7 cwt. When their diminutive size is considered they were certainly amongst the most remarkable little engines ever

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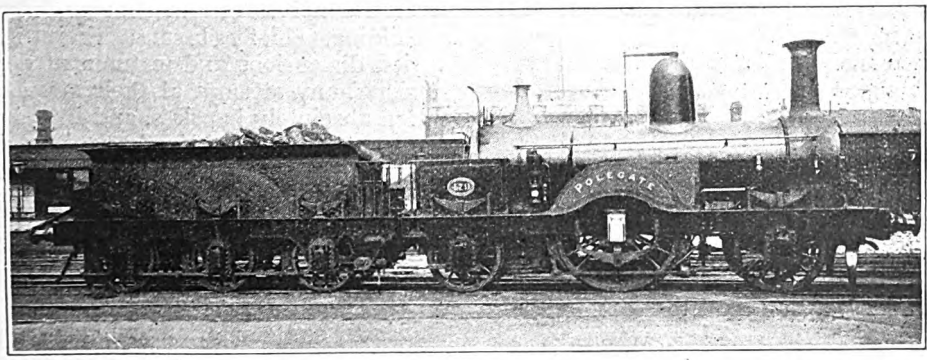
built, and were very successful in working trains of 100 to 120 tons. They were built between 1872 and 1880, and totalled up to the respectable number of 50 machines numbered from 35 to 84. The first batch Nos. 70 to 75, were named after the dirtiest districts in the East End of London that existed on the map, presumably because they were chiefly employed on the Thames Tunnel section.

Although most of the "Terriers" were stationed in the London area, 17 being at Battersea, 14 at New Cross, and 3 at West Croydon, nevertheless a number of them were employed on the coast and other branch lines, Brighton and Eastbourne each having 5 of the class, and Newhaven 2. The Midhurst branch was generally worked by one of this class.

One of the extreme peculiarities of Mr. Stroudley's régime at Brighton was the system of naming most of his engines after stations and villages on the line. Unconsciously he seems to have copied the old German system, in which most of the engines of the former private companies prior to their absorption by the State, were somewhat similarly named after "one-horse" villages with "thousand horse" names. Personally, I admit a liking for names for express engines, if such names as are selected are of a suitable character, but when it comes to naming local tank engines *Shadwell, Shoreditch, Ditchling, Itchingfield,* (what a temptation for the cleaners to scratch the paint off this engine !), and above all *Crawley*—though this was a very suitable name for many of the "Brighton" trains—I must admit that it is difficult to arouse a sufficiently deep enthusiasm for the practice. Besides, too, it was sometimes a source of confusion to old ladies, who, on discovering a string of carriages at Victoria with an engine at the back, the latter being labelled *Sutton* in large gilt letters on the side tanks—this being just the very station they wanted—sampled the train and duly found themselves in the Peckham Rye country or at some other equally interesting spot where they did not want to be landed. The peculiar nomenclature of the Brighton engines was continued by Mr. Stroudley's successor, who used up every village and hamlet on or near the line in finding names for the engines. Finally, the stock-in-hand became exhausted, and Mr. D Earle Marsh, who succeeded Mr. R. T. Billinton, failing to discover further villages, discontinued the practice in 1904. A few of Mr. Stroudley's express engines were named after prominent statesmen, and Mr. R. T. Billinton had a series of fine express engines named after well-known engineers. These names might well have been retained, and it seems a pity that when the villages were swept away, the engineers and statesmen suffered a similar fate, as did also the names of the later express engines of the early years of the present century, Nos 42 to 74. I might respectfully suggest to the Brighton locomotive authorities of to-day that I should like to see some of those names back again. *Victoria, Kitchener, Telford, Stephenson, Bessemer,* etc., are names worthy of being perpetuated, but I do not include amongst those suitable for



Photo] [*Locomotive Publishing Co., Ltd*

CRAVEN'S SINGLE ENGINE, No. 479, Polegate.
Wheels, 6 ft. 6 in.; cylinders, 16½ in. by 22 in.

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engines such appellations as *Mudborough* and *Sludgeville*, however celebrated those places may happen to be.

I seem to have wandered somewhat from the London local services, of which the "middle" and "outer" loop lines between London Bridge and Victoria were worked by Mr. Stroudley's larger 0-4-2 tank engines of the D class, often referred to as the "Bulldogs," of which there were no less than 125 in all, numbered 1 to 34, 221 to 299, and 351 to 362, constructed from 1873 to 1887. These engines (see page 12) had 5 ft. 6 in. coupled wheels, 17 in. by 24 in. cylinders, wheel base 15 ft., total heating surface 1,035.9 sq. ft., and weighed 38½ tons in working order. They are so well known that little further need be sid about them, and not only were they stabled at the London sheds, New Cross and Battersea, but also at many of the principal stations in the country.* Of the first lot, Nos. 1 to 34, built at Brighton works between November, 1873, and June, 1876, were in the London area except Nos. 22 to 28, which were retained at Brighton shed. Although nominally built for local train services, they frequently worked stopping main line trains with very satisfactory results.

Until the middle of the "eighties" there were also a good many miscellaneous designs of tank engines, a few of which remained in the London district chiefly on piloting work. The "Brighton" line, unlike its South Eastern neighbour, was always a tank engine line, and Mr. Craven, the predecessor of Mr. Stroudley, had designed and put into service a varied and miscellaneous assortment of all sorts and conditions of these engines, which were built in singles or pairs, and in one sense constituted a veritable museum of tank engine designs, though amongst them there were some good little machines. It is not my intention to enumerate all these engines; those who are interested will find a full account with illustrations in "The Locomotives of the L.B. and S.C. Railway,"† written by F. S. Hollandsche (query: Was he a Dutchman?), who seems to have been particularly interested in the "Brighton" engines. As quickly as Mr. Stroudley completed his standard "Terrier" and "Bulldog" classes, most of Mr. Craven's assorted samples were drafted to the country branches, where they terminated their existence. Those that I remember in the London district were Nos. 214 and 215, 0-4-2 well tanks, with 216 and 218 0-4-2 side tanks (both lots with double frames and outside cranks), which were stabled at New Cross, and were generally to be seen on pilot duties at London Bridge station. Similarly 217 and 261, of the same class as 216, were at Battersea shed, and acted as the Victoria pilots. These engines had 5 ft. wheels, and 16 in. by 20 in. cylinders. Another isolated specimen was No. 231, a 0-4-4 back tank, very similar in design to Mr. Cudworth's South Eastern engines 235-241 (illustrated in THE RAILWAY MAGAZINE, July, 1917), also with 5 ft. wheels and 16 in. by 20 in. cylinders, which I remember on the London Bridge and Crystal Palace service. This engine finished its career in 1886 on the Eastbourne branch.

At this point I may remark that one of the great features of Mr. Stroudley's locomotive practice was the complete system of standardisation and interchangeability of parts, which he introduced throughout the whole of the locomotive stock designed by him during the period of nearly 20 years (1870-1889), in which he had charge of the "Brighton" locomotive department. Consequently nearly all the engines designed by his predecessor were allowed to wear themselves out without undergoing rebuilding, chiefly because their many varied dimensions and features of design rendered any attempt at their standardisation absolutely hopeless, and in spite of the fact that many of Mr. Craven's engines were acknowledged to be excellent machines in their day.

The description which I gave of the South Eastern carriages could very well be applied to those of the Brighton Railway used on the London local trains, that is in so far as the interiors were concerned. Miserable cheerless wooden boxes most of them were. And they have not all disappeared, for I saw some of them at Clapham Junction early this year still doing

* Of the 125 engines of this class 46 were at Battersea, 36 at New Cross, 13 at Brighton, and the remainder at various smaller sheds, of which Horsham and Dorking had about half-a-dozen each.

† Published by The Locomotive Publishing Co., Ltd.

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duty. As far as the exteriors were concerned they were much more uniform in shape and size than those on the South Eastern, for in this respect the "Brighton" aimed at uniformity of contour of their carriages, and except for the Pullman cars, the external appearance of their trains was perhaps as regular and symmetrical as any in the country.

The Brighton Railway main lines may be likened to a triangle of which the apex is London and the base the coast line from Ford Junction through Brighton to Polegate. West of Ford Junction the coast line extends to Portsmouth, and east of Polegate as far as Hastings. The main line from London to Brighton may be compared to the perpendicular dropped from the apex of the triangle to a point near the middle of the base. The express engines were usually stationed at New Cross (for London Bridge) and Battersea (for Victoria) for the London area, and at Brighton, Eastbourne, Hastings (St. Leonards), and Portsmouth* on the coast. At the London end the main lines formed a sort of scissors crossing, so that the Victoria trains to Brighton passed underneath the line from Peckham Rye to Sutton, which formed the path of the trains between London Bridge and Portsmouth. The line from Victoria to Portsmouth joined that from London Bridge at Streatham, and the main line from London Bridge to Croydon, the oldest section of the Company's network of railways, made a straight line connection for the "City" end to Brighton. The expresses from London Bridge to Portsmouth used the South London line as far as Peckham Rye Junction, whence they diverged for Streatham via Tulse Hill. The result of this network was four distinct services of trains, which made Brighton and Portsmouth their objectives from the starting points of both of the large London stations, in addition to which there were the Eastbourne and Hastings services also from both termini. The junctions of Croydon and Sutton may in a sense be compared with that of Herne Hill on the Chatham line, where City and West End trains could be combined. But in this respect the Brighton working differed considerably from that of the Chatham, in that the main line traffic was much heavier, and many of the trains from London Bridge and Victoria to the coast ran independently throughout, leaving only certain of the slower trains to be combined at the nodal junctions.

In the early days the main line expresses to Brighton were worked by the old Sharp's single engines with 6 ft. 6 in. wheels and 15 in. by 22 in. cylinders, of the old 34 class, which in their time did remarkably good work in running from London Bridge to Brighton, 50½ miles in 65 minutes,* with fairly heavy trains, frequently attaining speeds of 60 to 62 miles per hour. These engines were broken up by Mr. Stroudley during the "seventies," but one of them, old 37, afterwards No. 360, lasted until early in 1882, though, of course, it had been taken off main line expresses a long time previously. But in the late "seventies" and early "eighties" a very large number of Mr. Craven's single express engines of various classes were employed upon the main line expresses.

Of these Battersea shed had a number of 6 ft. 6 in. single engines with double frames, and 16½ in. or 17 in. by 22 in. cylinders, of which the best known were 372 *Ventnor*, 373 *Shanklin*, 374 *Norwood*, and 375 *Croydon*, until 1878 known by their old numbers 125 to 128. The names were given to them in Mr Stroudley's time. The two former dated from Brighton works in 1856, but the two latter, with 17 in. by 22 in. cylinders, had come from the works of Messrs. Dodds & Co., of Rotherham, in 1871. The firm that built them had been founded by Mr. Dodds, of wedge motion fame, and the engines had really been constructed in 1866, but owing to financial difficulties were not completed and delivered until later. They were to be seen almost daily at Victoria until they were broken up in 1892 and 1888 respectively, and worked the lighter expresses both to Brighton and to Portsmouth. Two very similar engines of the same general dimensions, 482 *Hastings* and 483 *Victoria* (originally 255 and 256), of which the latter was also at Battersea and the

* The Portsmouth shed was then at Burdett Road, but subsequently a new shed was built at Fratton, where the Portsmouth engines are now stationed.

* The 65-minute timing for the best expresses dates, I believe, from 1857.

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former at New Cross, were also in evidence on the same trains. These came from Brighton works, where they were built in 1868.

The New Cross single engines of similar type, with 6 ft. 6 in. wheels, and 16½ in. by 22 in. cylinders, were seven in number, of which six were originally Nos. 236 to 241, but subsequently renumbered 476 to 481. They bore the names *Arundel, Reigate, Shoreham, Polegate, St. Leonards,* and *Eastbourne,* and were built in 1867 by Messrs. Nasmyth, Wilson & Co., of Patricroft, near Manchester. These engines, together with *Hastings,* also worked to Brighton and to Portsmouth from the London Bridge terminus. No. 479 *Polegate* is illustrated on page 13 , and gives a very good general idea of the appearance of Mr. Craven's express engines as subsequently modified by Mr. Stroudley.

The working from the London end of the line until near the end of the 19th century differed from present day working in that the express engines from Victoria or London Bridge to Brighton or Portsmouth ran direct to their destinations, and returned to London by the same route. At the present day there is a great deal of triangular working, in which an engine will run to Portsmouth, then work a train on the coast line to Brighton, and complete the round by returning from Brighton to London, or vice versa the other way round. In the late "nineties" the triangular working was instituted for certain trains once or twice weekly. In many former instances the engines would stand for a very considerable time before returning home, but in this respect the system was very similar to that in vogue on all railways. For instance, the Brighton engine which came up with the 8.45 a.m. business express from Brighton to London Bridge, where it arrived at 9.55 a.m., would go to New Cross shed, and wait there until required to return with the corresponding down evening express leaving London Bridge at 5.0 p.m. Similarly, the engine of the 8.30 a.m. up from Eastbourne returned with the 5.5 p.m. down, and the engines of the first up Portsmouth and Hastings expresses returned at 4.0 p.m. and 4.5 p.m. respectively from London Bridge. In these busy times on all railways an engine goes back with the first possible train, and where no "possible" trains exist, the working is accelerated by instituting the triangular method referred to previously, which also obtains very largely on the Midland and the North Eastern Railways.

A considerable number of the Craven single express engines of various types were stabled at Brighton, whence they ran both to London Bridge and Victoria, and also on the coast lines to Portsmouth on the one hand, and to Hastings on the other. Of these the most celebrated were Nos. 162 *London* and 163 *Brighton,* as they were named when I remember them first. Afterwards they were re-named *Penge* and *Sandown* respectively. These two engines were the only ones that the Brighton Railway ever possessed with driving wheels as large as 7 ft. in diameter, and the cylinders were 17 in. by 22 in. They had been built at Brighton works in November, 1863, and for many years worked the two most important trains on the line, the business expresses, 8.45 a.m. up from Brighton, and the 5.0 p.m. down, on which I think they continued until about 1875, when they were replaced on these trains by Mr. Stroudley's coupled engines. These trains had then become much too heavy for single engines of comparatively moderate dimensions, and in fact the timing of the 5.0 p.m. down was at the same time "let out" from 65 to 70 minutes. Nos. 162 and 163 had many features in common with Mr. Cudworth's famous South-Eastern singles, including the raised double fireboxes; in fact, it has always seemed to me that Mr. Craven borrowed Mr. Cudworth's designs. In one respect they differed from the latter, in that the trailing wheels under the footplate were of the same diameter, 4 ft. 6 in., as the leading wheels, whereas in Mr. Cudworth's engines, the leading wheels were 4 ft. 6 in. and the trailing wheels 4 ft. only. Even after they had been taken off the "business" expresses, 162 and 163 continued to work the less heavy expresses between Brighton and London until they were broken up in 1885 and 1888 respectively. In their day they were amongst the best known engines running south of London.

(To be continued.)

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Trafford Park.

By R. W. A. SALTER.

MR. MARSHALL STEVENS.
Chairman, Trafford Park Estates, Ltd.

WITH the increasing interest focussed on post-war commercial problems, too much attention cannot be devoted to the question of the suitable location of factories and the like by the vast majority of thoughtful people who are considering England's future industrial standing. In this connection it will not be amiss to give some account of Trafford Park which—although mostly constructed before the turmoil of the present days—is an admirable example of forethought in planning and construction. In addition to being well equipped with transport facilities, it possesses singular advantages for the establishment of works and factories, in that apart from its railway movement the estate adjoins the Manchester Docks, thus making it possible, by means of the Ship Canal, to manufacture or store alongside ocean terminals in what may be termed the now most densely populated area in the United Kingdom.

It was in 1882 that the project for the construction of the Manchester Ship Canal was first mooted, when a meeting of Manchester men proposed to "invite into the very heart of the town the tide which washes the Lancashire coast and invades the channel of the Mersey."

The present Estate proper adjoins the Manchester Docks on the south side and comprises about 1,183 acres in extent, with a frontage of 3 miles on the Ship Canal and 3½ miles on the Bridgwater Canal.

Several firms whose names will be familiar to RAILWAY MAGAZINE readers have established themselves in Trafford Park. Among them are the British Westinghouse Electric & Manufacturing Company, Ltd., whose mammoth works are visible from nearly all over the park; Turner Bros., Ltd., asbestos manufacturers; Taylor Bros. and Co., Ltd., who have an extensive railway wheel and axle works; and Royce, Ltd., the electrical crane manufacturers. The Lancashire and Yorkshire and the London and North-Western Railways have depôts in the park.

The Trafford Park Company and the firms on the Estate have 42 miles of railway track, which intersect the whole of the park, joining dock to factory and factory to main line. It is asserted that other than the railways which serve Trafford Park and participate in the traffic, there are only four or five railways in the kingdom with a greater general merchandise traffic than is conveyed over these 42 miles.

So that traders might obtain access to the main lines without cost for signalling and other charges usually exacted for private sidings, statutory powers were obtained from Parliament for the lines in

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the park. The shares are owned by the Trafford Park Estates, Ltd. No terminal charges are imposed except where terminal services or accommodation are provided.

A special arrangement has been made with the Manchester Ship Canal Company so that import or export traffic is hauled by rail from or to alongside any vessel in the Manchester Docks to or from a works in Trafford Park for the nominal charge of 6d. per ton. Where import traffic is concerned, arrangements can be made for discharge direct from the ship on to railway wagons alongside for haulage to Trafford Park. By this means traders save the charge for quay porterage.

The Manchester Dock Railways are 85 miles in extent. The total length of railways already completed at the Docks and at many points along the Ship Canal is upwards of 150 miles. The Ship Canal railways along the Canal between Manchester and Eastham are connected with the Cheshire Lines Committee at Irlam and Glazebrook; with the London and North-Western Railway at Latchford and Runcorn Docks; with the joint line of the London and North-Western and Great Western companies at Walton Junction (near Warrington), and at Ellesmere Port, the terminus of the Shropshire Union Railways and Canal Company, whose navigations extend to Chester, and through Shropshire, also by junctions with other canals into North and South Staffordshire. The Cheshire Lines are in connection with the Dock railways via Bridgwater Junction; the London and North-Western Railway at Weaste Junction; and the Lancashire and Yorkshire at New Barns Junction, Salford.

There are 52 of the Manchester Ship Canal Company's locomotives employed at the Docks, and these are run for a matter of expediency into Trafford Park. Some few have been in use since the Ship Canal was opened for traffic, but the majority are of recent build.

VIEW OF TRANSIT SHEDS.

Apart from these the Trafford Park Estates own four engines, one 12-in. four-coupled and two 15½-in. six-coupled by Hudswell, Clarke and Co., Ltd., Leeds, and one 14-in. six-coupled by Andrew Barclay, Sons and Co., Ltd., Kilmarnock. The latter is a saddle-tank locomotive, with wheels 3 ft. 10 in. diam.; heating surface 643 sq. ft.; grate area, 9½ sq. ft.; tank capacity, 700 gallons; bunker capacity, 30 cwt.; working pressure, 140 lbs. The weight in working order is 29½ tons.

The six-coupled engines built by Hudswell, Clarke & Co., Ltd., are similar to the

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later type belonging to the Ship Canal Company. This has proved an exceptionally serviceable pattern and will doubtless be followed by others of the same kind after the war. Principal details are: wheels, 3 ft. 4½ in. diam.; and weight, loaded, 34 tons. The one four-coupled engine by the same firm has also proved its worth, and has wheels 3 ft. 1 in. diam.; and a weight, loaded, of 21½ tons.

There are about 330 trucks of various types, including several 30-ton wagons. The fact of these high-capacity wagons doing excellent service brings to mind the repugnance with which many British railway officials have viewed the idea of American rolling stock in train-loads running on the lines of the United Kingdom. The bogies of these wagons, it happens, travelled the country to an appreciable extent when they conveyed Barnum's Show about the provinces, after having been brought over from the United States of America.

WORKPEOPLE LEAVING TRAFFORD PARK.

Mr. Marshall Stevens was one of the principal founders of the Manchester Ship Canal, and but for the application of his special knowledge of the commercial conditions during the six severe Parliamentary contests, powers for its construction would most certainly not have been obtained when they were. After serving from first to last upon the Committee which obtained the Parliamentary powers, he gave up his shipping and railway business to become manager of the Ship Canal undertaking, and organised the campaign which resulted in the authorised capital being subscribed by no fewer than 40,000 subscribers. He carried out the negotiations under which the Manchester Corporation found the remaining necessary capital; and prior to and for three years after the Ship Canal was opened, organised all the traffic arrangements for the new port of Manchester.

To have been largely responsible for the creation and to have entirely organised what has already become the fourth port of importance of the United Kingdom is a proud record; yet since retiring from the management of the Canal, Mr. Marshall Stevens, in his present position of Chairman of Trafford Park Estates, Ltd., has added to it by turning a private park of 1,200 acres into what, for all practical purposes, is a vast dock, estate and railway yard, with already more than 100 "works" of various kinds upon it employing many thousands of workmen.

He has frequently distinguished himself in the Parliamentary Committee Rooms,

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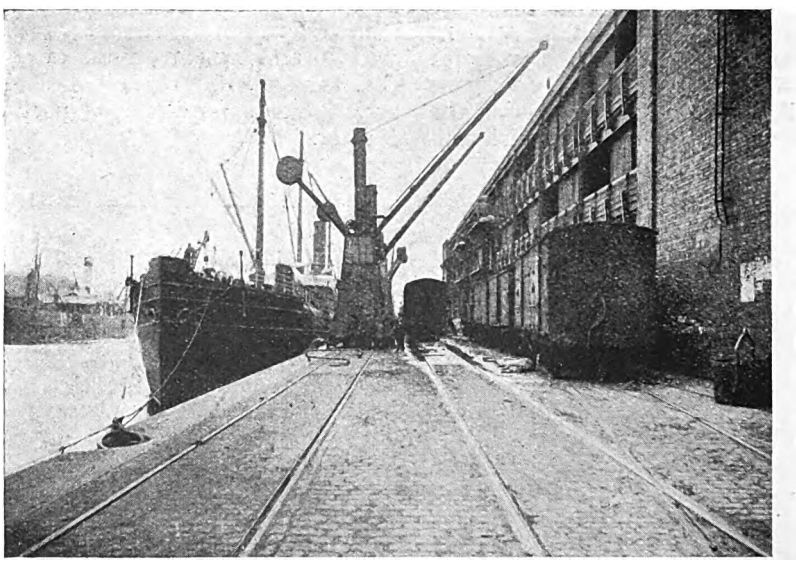
and before Royal Commissions, and is recognised as a leading authority upon railway and dock affairs.

He convinced the Royal Commission on Supply of Food in time of War—upon which His Majesty the King sat—that an additional supply of grain storage offered free to grain owners might considerably augment our stocks, which were frequently reduced to the requirements of only a very few weeks; and that the additional free storage space could be supplied at very small cost to the British Government.

His principal war work has been providing the largest warehouse accommodation of any organisation in the world, the primary object being to supply enormous new storage space for food and other materials; indeed, it is a recognised fact that this work in Trafford Park has done more to relieve congestion at the ports—principally of London and Liverpool—than has the action of any Government Department or Committee.

As a result of this foresight Manchester is now in the forefront of the ports in this respect.

Mr. Marshall Stevens is a very active director of the Manchester Chamber of Commerce, a member of that new Board which was specially elected to promote a patriotic business policy for the United Kingdom and the Empire, and he is Chairman of the Transport Committee of the Board.



RAILWAY WAGONS ALONGSIDE SHIP IN MANCHESTER DOCKS.

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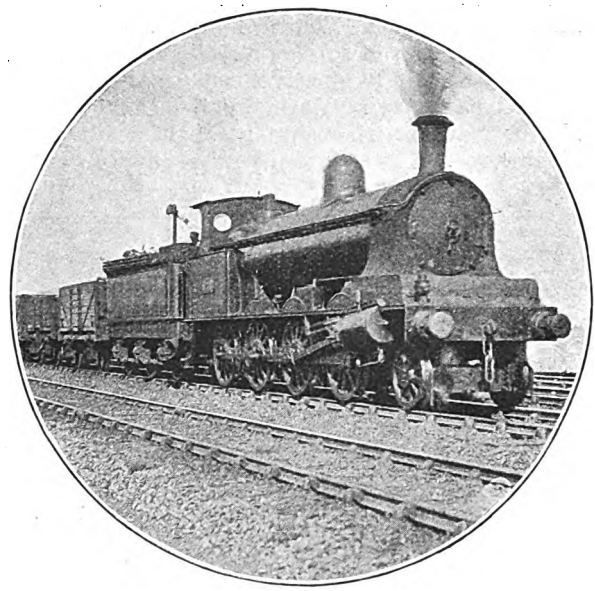
British Locomotive Practice and Performance.

By CECIL J. ALLEN.



Photo] [*Chas. S. Lake.*

2-8-0 WEBB 4-CYLINDER COAL ENGINE.

On Up mineral train at Bletchley.

SOME very brief notes will suffice to compass the usual review of locomotive construction which occupies the "Practice" space of a January article, partly because the amount of new construction during 1918 has been but small, owing to the continuance of war conditions for the major part of the year, and partly owing to the fact that most of the new locomotives built have been further specimens of types already existing. All of the latter have been engines for goods and mineral service, the London and North Western Railway, London and Yorkshire Railway, and North Eastern Railway having been building superheater 0-8-0's extensively; the Great Western Railway 2-8-0's and both the Great Western Railway and Great Northern Railway "Moguls," or 2-6-0's (the Great Western Railway total of this useful type has now reached no less than 160); the Great Eastern and Midland Companies' superheater 0-6-0's and the Caledonian Railway non-superheater engines of the same wheel arrangement. Of entirely new types only two are for passenger service—Mr. Robinson's fine four-cylinder 4-6-0 No. 1169, *Lord Faringdon*, on the Great Central Railway, and Mr. Urie's long promised, and at length materialised, No. 736, on the London and South Western Railway, a superheater 4-6-0 notable by reason of the size of its two outside cylinders—22 in. dia. by 28 in. stroke. Mr. Robinson has been showing much fertility in design, as in addition to the engine above-mentioned, an entirely new large-boilered 4-6-0 "fish" or mixed traffic engine, with 6 ft. wheels, has issued from Gorton Works during the year, together with a new version of the existing "Consolidations," with a 5 ft. 6 in. *Sir Sam Fay* boiler.

Then, on the Great Northern Railway, Mr. Gresley has added to his previous five 2-8-0 engines a further example—No. 461—in this case with three high-pressure cylinders, while another interesting Doncaster event has been the conversion of four-cylinder compound "Atlantic" No. 1300 to a two-cylinder simple, with 20 in. by 26 in. cylinders. The only other new type of 1918 has been Mr. C. Cumming's 4-6-0 mixed traffic type on the Highland Railway, following the neat and handsome

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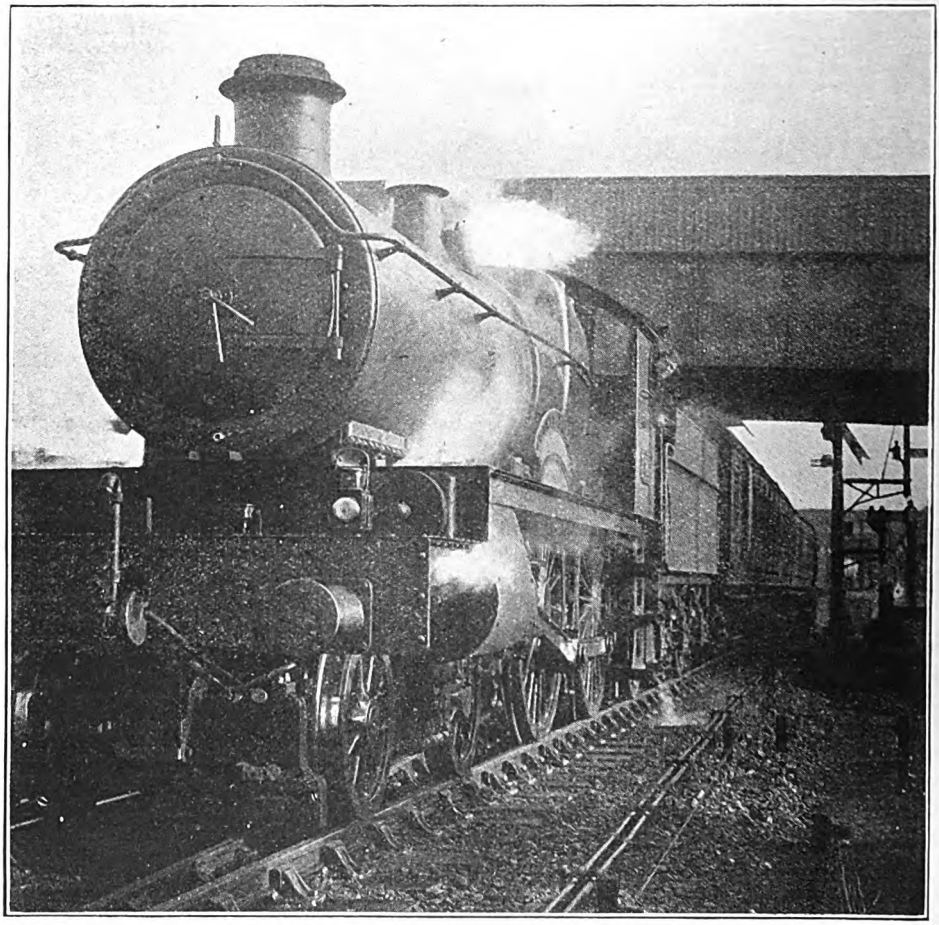
external lines to which that gentlemen has accustomed us in his large 4-4-0 engines *Snaigow* and *Durn*. Another remarkably interesting event of 1918, of a rather different character to locomotive construction, has been the laying down by the Great Northern authorities of water troughs near Knebworth. The lack of any water supply due to the fear that water will give out. But the provision of these troughs at a point only 27¼ miles out of King's Cross will supply a long-felt want, and has, doubtless, been rendered two-fold more necessary in view of the enormous trains which are constantly being hauled now-a-days as a result of war-time conditions.



Photo] [*Chas. S. Lake.*

GREAT WESTERN RAILWAY.

Express hauled by 4-4-0 Locomotive, No. 3820, "County of Worcester."

for non-stopping trains further south than Werrington, which is 79¾ miles from London, has been a serious handicap to drivers of heavy expresses, and the source, I believe, of much of the comparatively poor uphill work that one has recorded on the Great Northern Railway south of Peterborough, especially with non-superheater engines,

The principal time-table changes of 1918 took place in April and May, and were commented on at length in the June and July issues of last year. Further serious reduction of train services was threatened in the late autumn, but, as a matter of fact, with the exception of considerable further cancellations, especially on branch lines,

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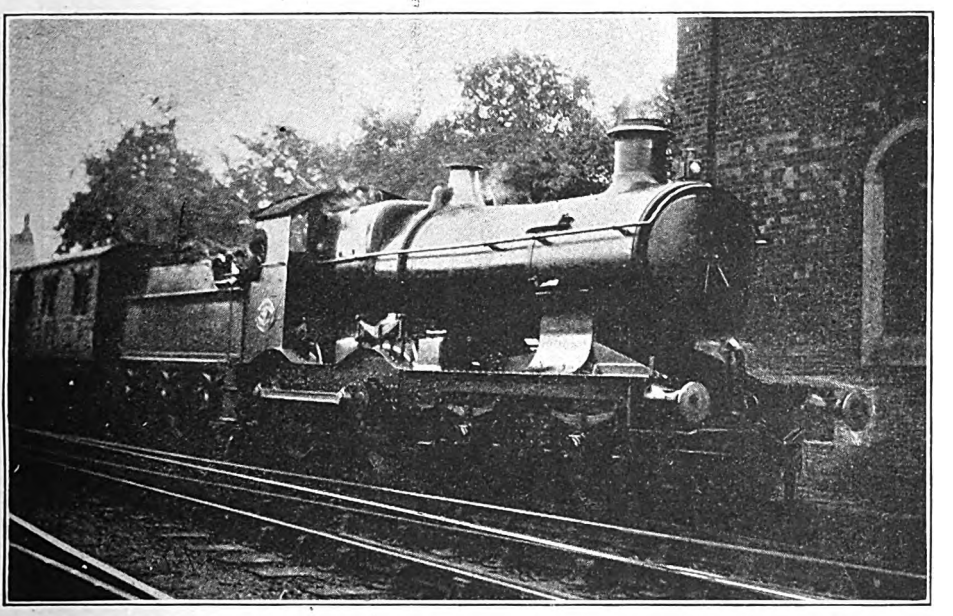
by the Glasgow and South Western, Caledonian and North Eastern Railways, the only alterations of note have been those made by the London and North Western Company in October, November and December, principally in virtue of the modified sailing times of the Irish steamers. The London and North Western alterations included the withdrawal in October of the Holyhead portion of the 6.40 p.m. express ex-Euston, which, without increase in total journey time to Birmingham, was re-diverted via Northampton, reaching that town in 83 min. non-stop from Euston. But, from the beginning of November, a new compensating service left Euston at 6.45 p.m., running non-stop to Stafford in 171 min., and apparently terminating at Crewe. From December 1st the Holyhead express has been restored, leaving at 6.30 p.m., and taking up the working of the Birmingham train as far as Rugby, whence its previous times are regained; the Birmingham express, however, leaves at 7 p.m., runs non-stop to Rugby in 100 min., and is accelerated 17 min. to Birmingham, where it arrives at 9.33 p.m. An extra 10 min. was allowed the 8.20 p.m. down Irish mail between Rugby and Crewe, the starting time from London being put back to 8.10 p.m. for this purpose on October 1st, but December saw the departure revert to 8.20 p.m., with a non-stop run to Crewe in the very fair time of 194 min., this being always a tremendously heavy train. The one-time 10.15 p.m. Irish express ex-Euston, and more latterly 9.25 p.m., started at 11.10 p.m., omitted its stops at Willesden and Nuneaton, and took 3½ hours non-stop to Crewe; the December time-tables saw the non-stop run retained, with a start at 9 p.m., and the remarkably lavish allowance of 235 min. to the first halting-point, but apparently the Furness Line portion of the old 9.10 p.m. down is carried also by this train. The remainder of the 9.10 p.m. ex-Euston leaves at the old time, and runs to Northampton, Rugby and Birmingham only, although it appears to have some mysterious connection leaving Rugby 20 min. after arrival there, and then taking the extraordinary time of 132 min. for the 75½ miles on to Crewe. During November only, the 4.45 p.m. express ex-Euston no longer



Photo] [*A. B. MacLeod.*

GREAT WESTERN RAILWAY.

Avalon class 5 ft. 8 in. 4-4-0 Locomotive, No. 3321, "Brasenose," at Culham.

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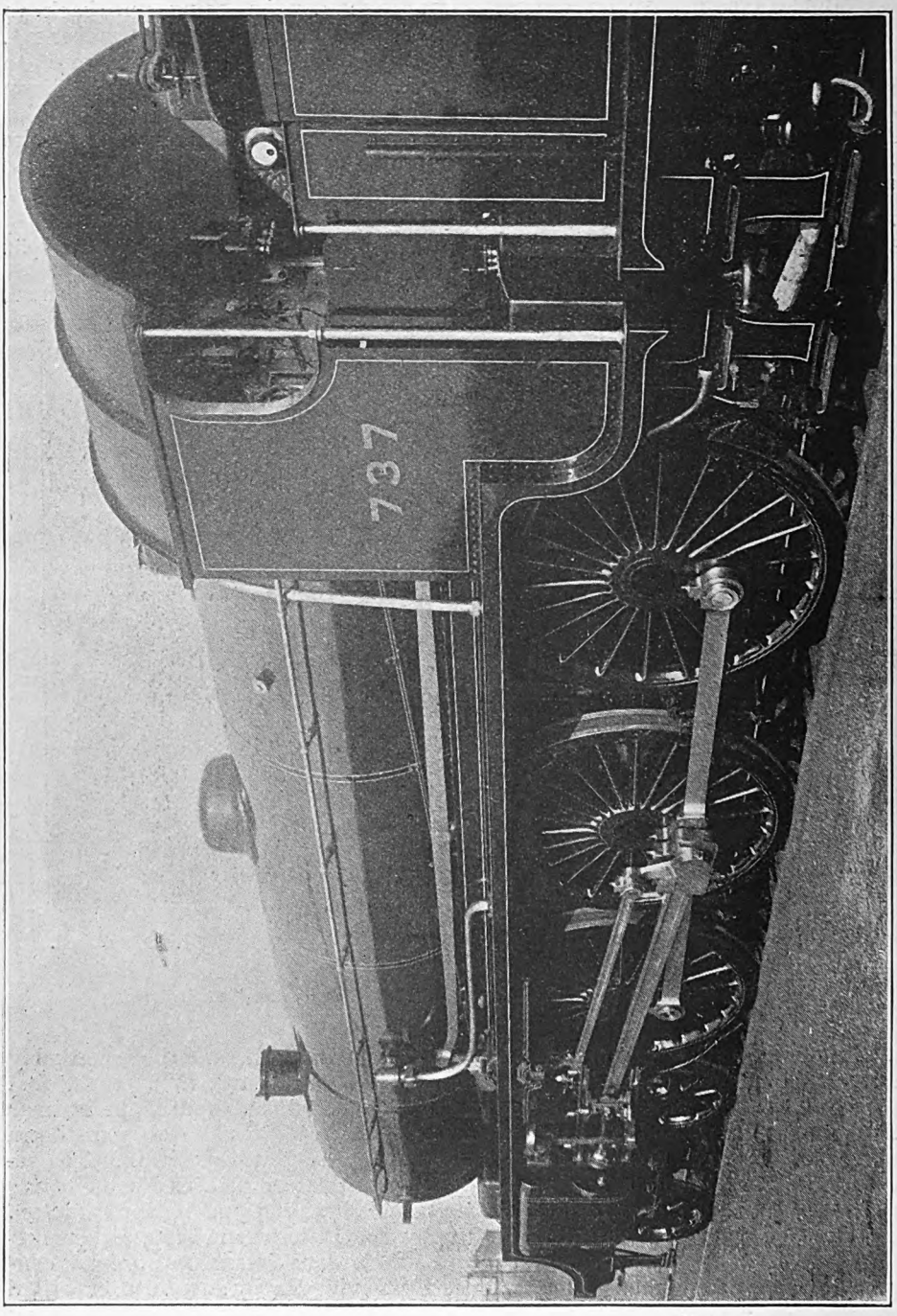

Photo] [Chas. S. Lake.

LONDON & SOUTH WESTERN RAILWAY.
New 4-6-0 Express Engine, No. 737.

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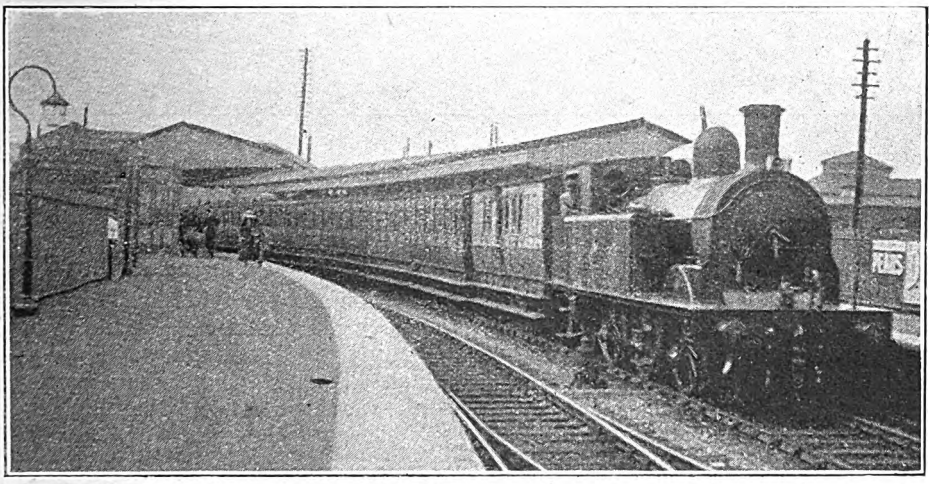
conveyed passengers to Belfast via Fleetwood, although still running through to Carnforth for the Furness line; Fleetwood passengers left by special train at 11.35 p.m., following the Glasgow night express, calling first at Crewe at 3.6 a.m., and thereafter at Warrington and Preston. The old arrangement is now, however, reverted to, the 4.45 p.m. down in addition conveying through coaches to Barrow. After two months of somewhat wild alterations of starting and arrival times, due to the temporary sailing of the boats in daylight only, the principal up Irish services now return generally to their pre-October times, including the up Belfast service, which, during November, left Fleetwood at 5.35 p.m. instead of in the early morning, and ran non-stop to Crewe, where the up afternoon Scotch corridor express was joined. During November, also, Stranraer passengers left Stranraer Harbour at 5.45 p.m., and had a special independent service from Carlisle to London, starting at 9.10 p.m., and calling at Preston, Warrington, Crewe, Rugby, Bletchley and Willesden. Euston was reached at 4.50 a.m.

Despite the warnings with which the summer opened as to the utter impossibility of running relief trains, the probabilities of travel permits, and various other prospective judgments hanging over the head of the unfortunate traveller, the amount of duplicate running probably exceeded that of the previous year. During the summer of 1918, indeed, there was barely a day on which there did not run in duplicate the 9.35, 10.50 and 12.30 p.m. from Waterloo, the 10.15 and 11 a.m. and the 1 p.m. from Paddington, the 7.20, 8.20, 8.35 and 11.30 p.m. from Euston, and the 10 a.m. and 3.10 p.m. from Liverpool Street, to name but a few examples. The Great Northern Company alone appears to have attempted to face these onerous conditions as far as possible without either duplication or piloting (excepting the modest assistance allowed out to Potter's Bar with the most abnormal loads), and from all that I have noted, appears nevertheless to have succeeded in keeping better time than most companies. I shall have more to say about East Coast loads in the next issue; suffice it for the present to remark that I have seen trains of formations up to *eighty-three* axles, and have noted the keeping of net time by a Great Northern "Atlantic," with a tare load of 529 tons. The Great Central Company has made up some very large loads indeed at week-ends, without duplication; the engines hauling these have of necessity received pilot assistance throughout, however, in view of the continued tightness of the schedules on that line.



Photo] [*K. A. C. R. Nunn.*

TAFF VALE RAILWAY.

Penarth-Cardiff train leaving Riverside station, hauled by 0-6-2 Tank Engine, No. 149.

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Photo] [*F. W. Goslin.*

MIDLAND RAILWAY.

Up Leeds Express on Oakley Troughs.

But this state of affairs, one is thankful indeed to be able to record, is within measurable distance of coming to an end There must of necessity be a considerable interval of settling down again into peace conditions before the longed-for news which November 11th, 1918, brought to us bears fruit even in an increased train service, let alone in an acceleration of express trains to anything like their pre-war speeds. What the future holds for us in this direction it is at present, of course, quite impossible to say. In the next issue I hope to discuss, in answer to a correspondent's query, future possibilities in scheduled speeds, taking into account the enhanced power and efficiency of the modern express locomotives of this country. I shall presuppose an arrangement whereby speed becomes a marketable commodity, and the fastest trains are made subject to extra charge and therefore are limited in accommodation and weight, as was the case in pre-war days in both the United States of America and on the Continent of Europe. But there are many unknown factors in regard to the future, as, for example, the relative importance which will be attached in future to the conveyance of freight and passengers, respectively. I am inclined to think that the latter consideration may weigh heavily, and for a considerable period against the revival of anything approaching the high speeds which obtained before the war on some routes, such as the Midland main line. In any case, for the present, in view of the leeway which must be made up in the repair and renewal of rolling stock and track, together with the shortage of coal and of staff, all of which are matters that will take many months to remedy, no material amelioration of travel conditions is to be looked for. The holiday traffic of next summer will probably be adequately catered for by relief trains, but accelerations of any moment are unlikely to take place during the course of the present year. It is risky, however, to attempt the *rôle* of a prophet on an occasion such as this.

Among serious suggestions which have been made concerning future railway conditions, it has been proposed that, in the event of the coming of the Channel Tunnel the construction gauges of all British railways shall be opened out sufficiently to allow of the passage of Continental rolling stock. The work involved in such an operation would be colossal. Continental loading gauges have a width of 10 ft. 2 in.

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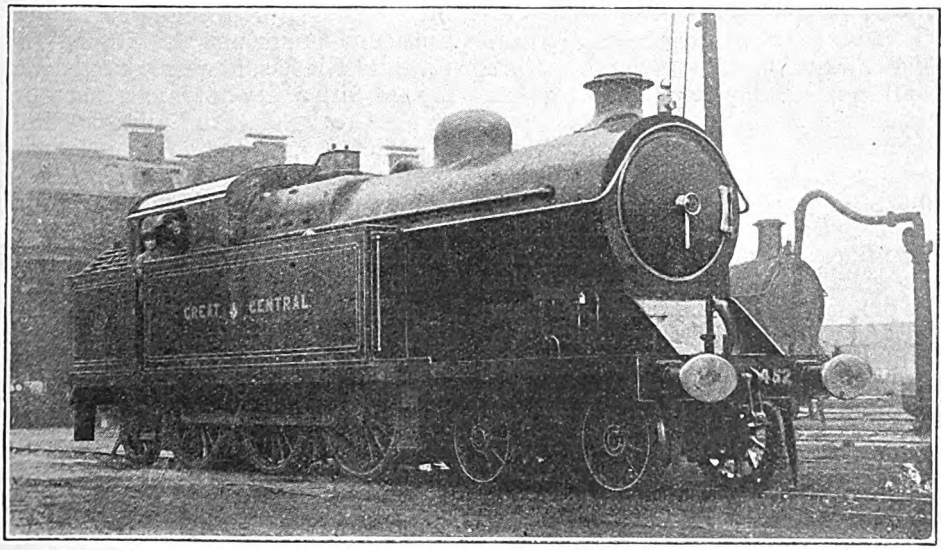
against our maximum of 9 ft. 3 in., so that in the first place the whole of the "six-foot way" of all double lines would require to be opened out, and all cross-over roads and junctions relaid, assuming the same clearances between tracks to be maintained. This, in its turn, would necessitate the rebuilding of all platform walls, practically all underline girder bridges, and all structures coming within the present minimum allowable distance of the tracks, while the vast majority of all underline brick bridges and viaducts would require widening. At the same time the considerably increased headroom required by the Continental loading gauge would probably necessitate the entire reconstruction of well over 90 per cent. of the overline bridgework. We are told that the cost involved, in respect of the whole country, would be covered by a few days' war expenditure, but this seems altogether too modest a figure, as some lines already decidedly on the tight side in the matter of loading gauge would need almost complete reconstruction.

Further, the habit of reckoning in terms of war costs is a pernicious one; now that the war is over, we have to return to the plain economic necessity, even under nationalisation, of securing a reasonable return in profit on all future expenditure. Doubtless our traffic with the Allied European countries will grow to far larger dimensions in the days to come than ever before, but it is not easy to conceive of an interchange of commodities so vast in extent as would pay interest on the immense sum here involved. For in return for this expenditure, let it be remembered, sufficient must be economised by through running of Continental vehicles to their British destination, and *vice versa*, as opposed to transhipment at Calais, Dover, or elsewhere, to make the gauge transformation of British railways economically worth while. A preferable alternative would seem to be to let existing British vehicles run through to Continental destinations, even despite the more limited carrying capacity enforced by our restricted loading gauges—the penalty, by the way, of our having pioneered in railway traction. Let it also be remembered that the heaviest through traffic is likely to occur during the reconstruction period now about to commence, *i.e.*, before there is any possibility of the Channel Tunnel itself having been opened, although this condition of things will doubtless be met by the increased provision of train ferries for goods vehicles between British and Continental ports. After the tunnel has been constructed, as seems probable, the question



Photo] [*J. Macartney Robbins.*

GREAT CENTRAL RAILWAY.

4-6-2 Superheater Tank Engine, No. 452, at Neasden.

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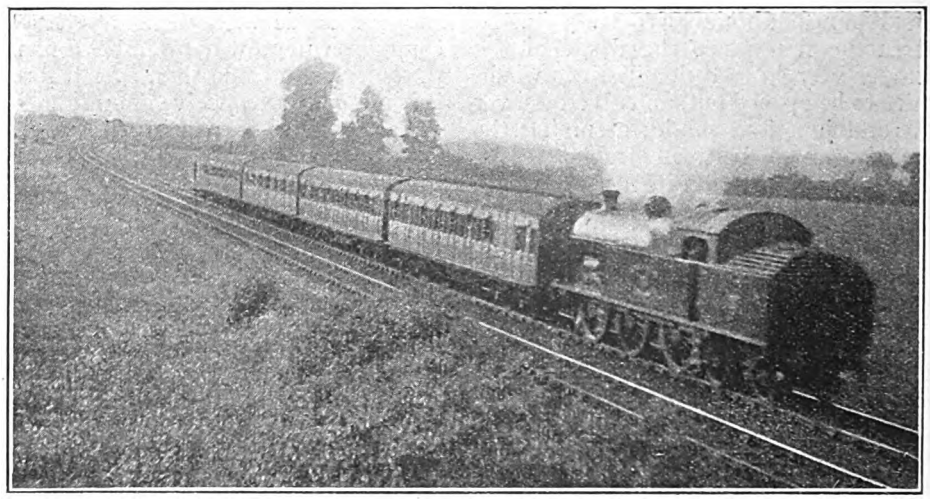

Photo] [*K. A. C. R. Nunn.*

METROPOLITAN RAILWAY.

Verney Junction–Baker Street train nearing Wendover. Superheater 0-6-4 Tank Engine, No. 94, "Lord Aberconway."

might be faced of enlarging the South Eastern and Chatham Railway loading gauge between Dover and London for general convenience in through running to the metropolis, but the major scheme seems somewhat impracticable.

An enlargement of loading gauge would certainly benefit the designer of locomotives, carriages, and wagons in this country, who is at present much hampered as regards cross-sectional expansion by the limited dimensions now enforced. Some lines are considerably more restricted than others, and in this connection another proposal which is now more than ever likely to fructify—the standardisation of British locomotives—presents considerable difficulties. It could hardly be expected hitherto that the lines enjoying the largest loading gauges would agree to accept the smaller gauges of less fortunate neighbours as their standard in rolling-stock construction. On the other hand, standard locomotives and vehicles built to the larger gauge would not pass over the lines of those companies possessing the smaller gauge without fouling structures *en route*. Nationalisation of British railways, however, is bound to bring this problem to a head, and meanwhile much might be done as regards the standardisation of working parts, which would enable these to be turned out by contractors in large quantities in the most economical way possible. Standardisation has been carried out in India on lines somewhat of this character, and has from all accounts operated very successfully.

In my century article of October last I was regretting my inability to include any descriptions of running on Irish railways owing to the absence of any Irish runs in my log-books. A reader who has done a considerable amount of timing in the Emerald Isle has, however, kindly come to my aid with a series of interesting journeys on the Great Northern Railway of Ireland, to which I am glad to be able to give publicity, as the performances concerned were in all cases of a high order. First of all, however, let me run briefly over the gradients between Dublin and Belfast, which are by no means of the easiest. From Dublin to Drogheda the line undulates, the most pronounced summits being at a point 3¼ miles out of Amiens Street, and again at the sixteenth mile post. The ascent to the former is gradual, but the descent includes 1½ miles at 1 in 200 past Howth Junction. In the second case, however, there is a sharp climb past Rush and Lusk, of which 2¾ miles are at 1 in 163-180, while the subsequent fall to Skerries includes 1½ miles at 1 in 150. Elsewhere the grades mostly do not exceed 1 in 300, in short lengths. At a point 1¼

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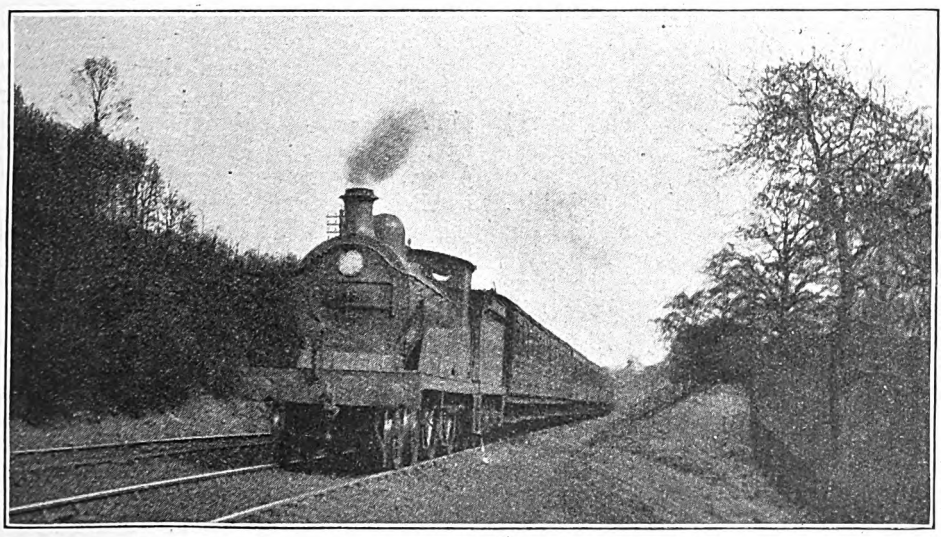
miles beyond Drogheda, a steep rise commences to the 37¼ mile-post out of Dublin, of 4¼ miles at 1 in 167-177; for the next nine miles the line is on falling grades, of which the first 4¾ are at 1 in 138-195-188, past Dunleer. There is also a short rise before Dundalk, with a final fall of 1½ miles at 1 in 150 into that town.

The highest summit of the journey, however, is that to which the ascent is commenced immediately after leaving Dundalk, and occurs at the 65½ mile post, where the line is 520 ft. above sea-level. In all the climb is 10¾ miles long; from 56¼ to 59½ miles the grade is mainly 1 in 100, but as steep in one place as 1 in 91; from 59½ to 62½ the line rises at 1 in 109-142; thence, after half-mile fall at 1 in 140, the culminating ascent is at 1 in 120-135 for 2¼ miles. On the north side, from 65½ to 70½ miles the descent is almost all at 1 in 100-113; thence after ¾-mile at easier grades it is resumed for 2¾ miles at 1 in 110-150, past Goraghwood. On the subsequent gentle undulations to Portadown there is a bad service slack to 30 miles per hour at Poyntzpass. After Portadown there is a moderate rise of eight miles, mostly at 1 in 200-230, to the ninety-sixth mile-post, between Lurgan and Moira, and there is a similar descent for the last 7½ miles from Lisburn into Belfast. This is, therefore, a difficult road over which to run such very fast trains as were scheduled a short time ago (some of which still remain), really brilliant running being called for by such times as 38 min. between Dublin and Drogheda, 31½ miles; 63 min. from Dublin to Dundalk, 54¼ miles, with an intermediate 20 m.p.h. slack at Drogheda; 28 min. between Drogheda and Dundalk, 22½ miles; 43 min. between Dundalk and Portadown, 33¼ miles, includ the Mourne Mountains summit and Poyntzpass slack; and, finally, 29, 30, and 31 min. for the 25 miles between Portadown and Belfast. My only regret concerning my correspondent's logs is that he gives maximum but no minimum speeds, and a still more vital omission is that of any passing times at the various summits. In future he should on no account miss recording the time of passing the 16, 37¼, 52, 65½, 74 and 96 mile-posts out of Dublin, all of which are most important strategic points. Without these details it is impossible properly to appraise the hill-climbing.

On the first journey, made from Dublin to Belfast by the then 7.25 a.m. limited mail express, 4-4-0 superheater, No. 170 had a tare load of 186 tons to Portadown, or 200 tons full. Howth Junction, 4¾ miles, was passed in 9 min,. at 61 m.p.h., and Malahide, 9 miles, in 12



Photo] [*P. S. A. Berridge.*

SOUTH EASTERN & CHATHAM RAILWAY.

Express train hauled by 4-4-0 Locomotive, No. 732.

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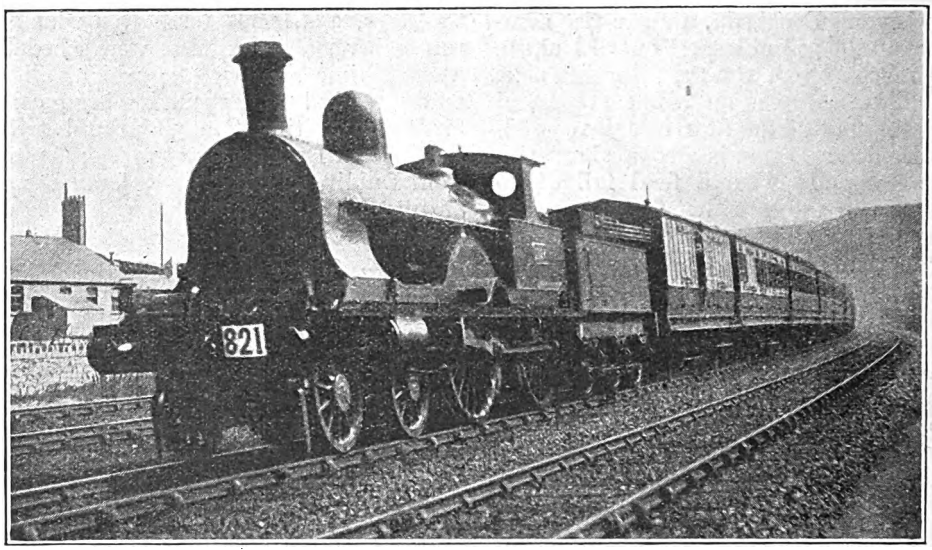

Photo] [*W. H. C. Kelland.*

LONDON & NORTH WESTERN RAILWAY.

4-4-0 Compound Locomotive, No. 1927, "Goliath," on Liverpool–Bangor train, near Llandudno Junction.

min. 50 sec., at 69 m.p.h.; the 9 miles thence to Skerries, including the 16 m.p. summit, occupied 10 min. 5 sec., the 6 miles from Skerries to Gormanston 6¼ min, with a maximum of 65 m.p.h. at Balbriggan; and the final 7¾ miles from Gormanston into Drogheda 8 min. 20 sec., making a total of 37½ min from Dublin, or ½ min. inside schedule. From Drogheda the 10 miles to Dunleer, over the 37¼ m.p. summit, occupied exactly 15 min., and the subsequent 12½ miles to Dundalk 11½ min., speed rising to 75 m.p.h. on Dunleer bank. Total time from Drogheda to Dundalk was thus 26½ min., or 1½ min. under booked time. Out of Dundalk the 8¼ sharply ascending miles to Adavoyle occupied 14 min. 10 sec., and the next 9¼ miles to Goraghwood 8 min. 55 sec., in virtue of a second maximum of 75 m.p.h. on Bessbrook bank; the 7¾ miles from Goraghwood to Scarva took 8 min 55 sec., including Poyntzpass slack, and the 8 miles thence to Portadown 9 min. 55 sec., making a total of 41 min. 55 sec. from Dundalk—a further gain of 65 sec. on schedule. At Portadown the Londonderry coach was detached, leaving 175 tons to go forward, and, thus lightened, No. 170 passed Lisburn, 17¼ miles, in 21 min. 55 sec., at 68½ m.p.h., and reached Belfast in 31 min. 5 sec., once more 55 sec. to the good. Aggregate gains on schedule time were therefore 4 min. from Dublin to Belfast.

The 3 p.m. express from Dublin to Belfast was much more substantially loaded, No. 191, large superheater 4-4-0, having to tackle 305 tons to Dundalk, and 280 tons thence to Belfast, although on a slightly easier schedule. Howth Junction was passed in 10½ min.; Malahide in 14 min. 20 sec., at 66½ m.p.h.; Skerries in 25 min. 5 sec.; Gormanston in 31 min. 5 sec., at 65 m.p.h.; and Drogheda was reached in 39 min. 55 sec., booked time in this case being 41 min. From Drogheda to Dunleer 15 min. 55 sec. was required on this journey, but, with a maximum of 70½ m.p.h. on Dunleer bank, Dundalk was reached in 28 min. 50 sec., or 10 sec. inside schedule. It took 16 min. 50 sec., again, to pass Adavoyle from Dundalk, despite the slightly lightened load, and 27 min. 5 sec. to reach Goraghwood (17½ miles), where this train stops, but the allowance is 28 min. Maximum speed on Bessbrook bank was in this case 73½ m.p.h. There was no difficulty in covering the 15¾ miles from Goraghwood to Portadown (then allowed 23 min.) in 22 min. 5 sec., and a further 55 sec. margin was thereby added to the

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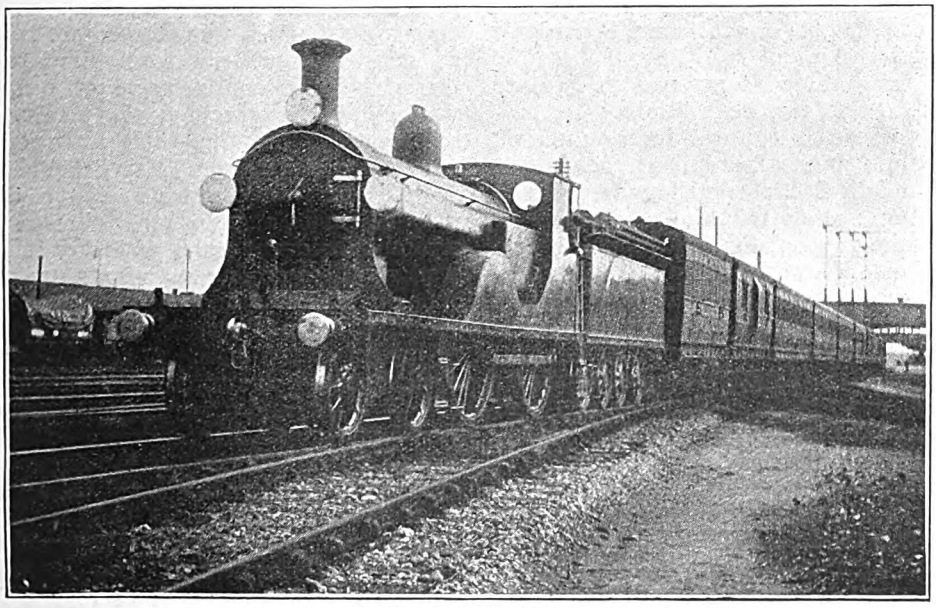
locomotive gains. The final length into Belfast consumed 55 sec. under the 31 min. scheduled; a top speed of 69½ m.p.h. was attained at Dunmurry, and Lisburn was passed in 22¾ min. The total gain to engine on this run was a fraction over 3 min.

Finally, in the down direction, there was a run on the tightly-timed 6.30 p.m. "diner" from Dublin, with a tare load of 205 tons and a gross load of 220 tons. No. 191 was again the engine. Howth Junction was passed in 9 min. 10 sec., Malahide in 13 min. 5 sec., Skerries in 23 min. 10 sec., and Drogheda in 37 min. Here a coach was slipped, reducing the load to 195 tons, and the customary slack to 20 m.p.h. was made over the Boyne Viaduct. Regaining speed rapidly, No. 191 covered the ensuing 10 miles to Dunleer in 13¾ min., attained 69 m.p.h. on Dunleer bank, and 74½ on its continuation at Castlebellingham, and reached Dundalk in 62 min. 5 sec., or 55 sec. early. From there Adavoyle was passed in 14 min. 5 sec., and, with a maximum of 75 m.p.h. on Bessbrook bank, Goraghwood was reached in 23 min. 50 sec. or 4 min. 10 sec. under the somewhat easy allowance of 28 min. From Goraghwood to Scarva (7¾ miles), including Poyntzpass slack, took 10 min. 55 sec., and from Scarva to Portadown (8 miles), 10 min. 50 sec., in each case start-to-stop, and in close adherence to booked times. In conclusion, the very smart time of 29 min. for the 25 miles from Portadown to Belfast was kept, with 5 sec. to spare, Lisburn being passed in 21 min. 40 sec., and a speed of 75 m.p.h. being attained on the final descent into Belfast. Nearly 5½ min. in all were gained, therefore, on this most successful run. The train concerned now starts at 7.30 p.m. from Dublin, calls at Drogheda, and is slowed by 15 min.

In the reverse direction No. 113, *Neptune*, a large 4-4-0 not superheated, had to deal with a load of 193 tons tare out of Belfast, or 205 tons full, and 230 tons from Portadown, on the 5.30 p.m. up Limited Mail. Lisburn, 7½ miles, was passed in 11 min. 10 sec.; Lurgan, 20 miles, in 25 min. 25 sec., at 68½ m.p.h.; and Portadown was reached in 30¾ min. Out of Portadown No. 113 got through Scarva, 8 miles, in 11½ min.; Goraghwood, 15¾ miles, in 20 min. (after slacking at Poyntzpass); and Adavoyle, 25 miles, in 33 min. 5 sec. On the sharp descent to Dundalk speed rose to 73½ m.p.h., and that town was reached in 42 min. 10 sec.



Photo] [*W. H. C. Kelland.*

LONDON & SOUTH WESTERN RAILWAY.

4-4-0 Locomotive, No. 303, on Up Express, passing Eastleigh.

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From Dundalk, Castlebellingham, 7 miles, was passed in 10 min. 5 sec., and Dunleer, 12½ miles, in 16 min. 10 sec.; descending to Drogheda *Neptune* touched 71 m.p.h., and after slacking as usual over the Boyne Viaduct, stopped at Drogheda in 5 sec. under 28 min. There is a favourable start for south-bound trains from Drogheda, down some miles of 1 in 300, and of this No. 113 took full advantage, passing Laytown, 4¾ miles, in 7 min. 5 sec., touching 65 m.p.h. at Balbriggan, and getting through Skerries, 13¾ miles, in 16¼ min. Malahide, 22¾ miles, was passed in 26 min., with a maximum on Rush and Lusk bank of 69 m.p.h.; Howth Junction, 27 miles, in 30 min. 5 sec., and Dublin was reached in 37 min. exactly. Economies on schedule on this journey were therefore 15, 50, 5 and 60 sec. on the successive sections, or just over 2 min. in all.

Lastly, by way of comparison between the work of superheater and non-superheater engines, there is a later run with the same train, now starting at 4.30 p.m., on which No. 171, *Slieve Gullion*, of the large superheater 4-4-0 class, had to tackle a considerably heavier load of 223 tons tare (240 tons full) from Belfast, and 270 tons from Portadown. The work, however, was much more brisk throughout. Lisburn was passed in 11 min. 5 sec., Lurgan in 25¼ min. (at 69½ m.p.h.), and Portadown was reached in 30½ min. From there the time occupied to Scarva was 11 min. 10 sec.; to Goraghwood 19¾ min.; to Adavoyle, where the top speed was 74 m.p.h., 32¾ min.; and to Dundalk 41¾ min. Out of Dundalk Castlebellingham was passed in 9 min., at 60 m.p.h., and Dunleer in 15¼ min.; touching 72½ m.p.h. before Drogheda, No. 171 was into the latter town in 26 min. 55 sec. A brilliant start was made from Drogheda southwards, Laytown being passed in 6 min. 50 sec., at 61 m.p.h.; Balbriggan, 10 miles, in 11 min. 50 sec., at 67 m.p.h.; Skerries in 15 min. 50 sec; Rush and Lusk, 17¾ miles, in 20¾ min.; while the next 9¼ miles to Howth Junction were reeled off in 7½ min., speed rising to 74 m.p.h. Amiens Street, therefore, was reached in the remarkably fast time of 34 min. 35 sec. for the 31¾ miles, the engine having by exceedingly fine running gained 30 sec., 1¼ min., 65 sec. and 3 min. 25 sec., or no less than 6¼ min. in all on the fastest up schedule in operation. As I said in October, such work as this is certainly fit to rank with the best that we can produce on this side of the "Herring Pond."

I have also a run from another correspondent on the neighbouring Great Southern and Western Railway, which is worth reproduction. The train concerned was the up afternoon "diner" from Cork, loaded to 11 corridor coaches, and hauled by 4-4-0 No. 329, with a pilot in the shape of a small 4-4-0 of the "60" class. From Limerick Junction, where my friend joined the train, the first 12¼ miles of gentle undulations to Goold's Cross occupied 16 min. 33 sec., speed rising to 69 m.p.h. on the 1¾ miles down at 1 in 230 immediately following; Thurles, 19½ miles, was passed in 25 min. 7 sec; mile-post 83, 24 miles, in exactly 30 min.; and Lisduff, 33½ miles (approaching which station a bad slack was experienced), in 42 min. 3 sec. On the short 1 in 177 descent at the 70th mile-post the mile-a-minute rate was again attained, however, and Ballybrophy, 40¼ miles, where the customary stop was made for water, was reached in 49 min. exactly, or 47 min. net. On restarting the engines took full advantage of the 2¾ miles descent to Caddagh Cabin, attaining 70 m.p.h. thereon; so Mountrath, 7¼ miles, was passed in 9 min. 32 sec.; and Maryborough, 15¾ miles, was reached in 18 min. 26 sec. This made a total time from Limerick Junction, inclusive of 6 min. standing at Ballybrophy, of 73 min. 26 sec., whereas the time-table allowed 75 min. The start from Maryborough is again favourable, commencing as it does with 1¼ miles at 1 in 170, followed by several subsequent miles of easily falling grades; these produced a maximum rate of 69 m.p.h., Portarlington, 9¼ miles, being passed in 11 min. 1 sec., and Monasterevan, 14¼ miles, in 16 min. A severe signal check, however, was experienced at Cherryville Junction, and a worse one at Kildare, the 8¼ miles from Monasterevan to mile-post 28 taking in all 13½ min. Some fast running followed on the subsequent entirely favourable grades to Dublin. The 10 miles from mile-post 28 to Sallins were covered in "even time," the 4¾ miles thence to Straffan in 4 min. 4 sec., and the 8¾ miles thence to Clondalkin, on which the speed rose to 75 m.p.h., in 7 min. 58 sec., making a total of 23¾ miles in 22 min

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2 sec. Adverse signals compelled a halt after a long preliminary slack at Inchicore, reached in 55½ min. from Maryborough, or 52 min. net for a journey of 49½ miles—a quite brilliant piece of work. In the end Kingsbridge terminus was arrived at in 61½ min. from Maryborough, or in 1½ min. under schedule, inclusive of the slacks at Kildare and Inchicore stop.

In conclusion I should like to describe an excellent run which I enjoyed recently on the 9.20 p.m. Inverness express out of Euston, London and North Western Railway. As is customary, our train formed the first portion from London, picking up only *en route*, whereas the second, or Stranraer portion, both set down and picked up at intermediate stations. In both cases the tare load exceeded 400 tons, our train being made up to twelve 8-wheelers and two 12-wheeled "sleepers," weighing empty 406 tons, and with passengers (on starting) 430 tons. Our engine was one of the superheated 4-4-0 "Precursors," No. 300, *Emerald*. There was considerable slipping on Camden bank, the rails being greasy, and the usual p.w. caution was experienced at Chalk Farm, so that it took us 12 min. 10 sec. to get through Willesden, 5.4 miles. But we were now doing 53 m.p.h., and sustained 50 past Harrow and 49 beyond Pinner; we covered the 12.1 miles from Willesden to Watford, passed at 58 m.p.h., in 14 min. 5 sec., and the 14.2 miles thence to Tring, where our minimum rate was 46 m.p.h., in 17 min. 5 sec. Total time from Euston was thus 43 min. 20 sec. A brisk run down past Leighton, with a maximum of 67 m.p.h., brought us into Bletchley, where we stopped slowly in order to fit the train to the platform, in 58 min. 50 sec. Schedule for this 46.7 miles is 59 min. From Bletchley we started well, passing Wolverton, 5.8 miles, in 9¼ min., at 56½ m.p.h., and then ascended the 7.2 miles to Roade in 8¾ min., with a maximum of 50 m.p.h. exactly. At Blisworth, passed 3 min. 20 sec. later (3 miles) we were doing 55½ m.p.h.; the next 6.8 miles to Weedon took 7 min. 10 sec., the 5.6 miles on to Welton, with a minimum of 47 m.p.h., 6 min. 50 sec., and the 7.3 miles on to Rugby 9¾ min., inclusive of a concluding signal check. So the 35.9 miles from Bletchley to Rugby took 45 min. 5 sec., or 44 min. net as scheduled. Out of Rugby engine and load were unchanged, and we passed Shilton, 8.7 miles, in 13 min. 20 sec.; Nuneaton, 14.5. miles, in 19 min. 25 sec. (at 64 m.p.h.); Atherstone, 19.7 miles, in 24 min. 40 sec.; and Tamworth, where speed rose to 67 m.p.h., 27.5 miles, in 32 min. exactly. We now got signals "on" badly through Lichfield and Armitage on account of the 5.30 p.m. "slow" from Euston ahead, and took 19 min. 5 sec. to cover the 14.1 miles between Tamworth and Rugeley; the next 9.4 miles to Stafford, however, were reeled off in 10¾ min., making 61 min. 50 sec. from Rugby. From Stafford up to Whitmore the 14 miles occupied 17 min. 25 sec., and the remaining 10.5 miles into Crewe were covered easily in 12 min. 50 sec., so that we arrived within 5 sec. of our 92 min. schedule. Here *Emerald* came off, having no cause to be ashamed of a net time of 89 min. for the 75.5 miles from Rugby, and the good work which preceded it.

At Crewe we attached a 4-cylinder 4-6-0 "Claughton," No. 695, *Sir Arthur Lawley*, with the load still unchanged for the run to Carlisle, and made a good start, passing Winsford, 7½ miles, in 11 min. 10 sec., at 61 m.p.h., attaining 65 before Hartford, and getting through Weaver Junction, 16¼ miles, in 19 min. 35 sec. Then came a signal check at Moore, just before the sharp rise to the Ship Canal bridge, so that we took 29 min. 55 sec. to pass Warrington, 24⅛ miles; but we reached Wigan, nevertheless, in 46 min. 35 sec., or 25 sec. under schedule. Net time for this 35⅞ miles' run was 44 min. At Wigan we attached a 6-wheeled van, bringing the tare load to 419 tons, and as the train had been gradually filling up until it was now packed to repletion, the gross load was not less than 460 tons. In the darkness I fear I missed the stations on the sharp rise out of Wigan, and am uncertain of any further times until we passed Euxton Junction, 9⅝ miles from Wigan, which we did in 15 min. exactly. Before this point we had touched 69 m.p.h., and after it we reached 67, so getting through Preston, 15⅛ miles, in the good time of 21 min. We passed Preston at the usual very low rate of speed, and did nothing momentous on the level stretch which succeeds the 1 in 95 rise out of that station; the 9½ miles from Preston to Garstang took 12 min. 25 sec., and the 11½ miles thence to Lancaster 12¼ min. At Hest Bank we touched 64½ m.p.h., and

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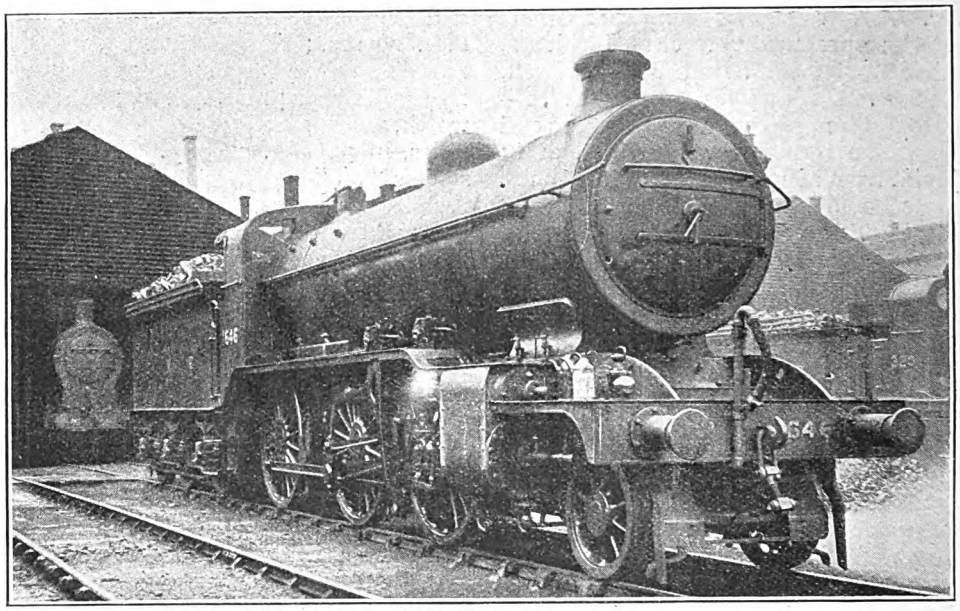

Photo.] GREAT NORTHERN RAILWAY. [*W. H. Whitworth.*
2-6-0 Locomotive, No. 1646.

completed the 6¼ miles on to Carnforth in 6 min. 5 sec. Falling to 41 m.p.h. on the subsequent rise, and touching 55 at Milnthorpe, we covered the 12⅞ miles from Carnforth to Oxenholme in 17 min., and then essayed, as I had hoped, the ascent of Grayrigg bank without assistance. We passed Oxenholme at 43 m.p.h., and fell finally to 27 on the 1 in 106, so taking 13 min. 40 sec. for the 7 miles between Oxenholme and Grayrigg, but this was no mean achievement with a 460-ton load. A run of 8½ min. then brought us to a stand at a point ¼-mile beyond Tebay Station, 6¼ miles from Grayrigg, and 68½ miles from Wigan, which had taken us 90 min. 55 sec. A stop of 70 sec. sufficed for the attachment of a bank engine in rear, after which we compassed the 5⅜ miles ascent to Shap Summit in 12 min. 40 sec., running thence to Penrith, 13½ miles, in 13 min. 55 sec., with a maximum speed of 71½ m.p.h., and from Penrith on to Wreay, 13 miles, in 13¼ min. But luck was against us in the shape of a dead stand for signals at Upperby Junction; otherwise we should easily have completed the 105⅛ miles from Wigan in 137 min. instead of the 142 min. allowed—again excellent running, of but little below pre-war standards. My continuation journeys in Scotland I must hold over for a future occasion.

You may send the "Railway Magazine" post free to the troops by handing it in at any post office in the British Isles.

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Antofagasta (Chili) and Bolivia Railway.

Mr. A. W. BOLDEN.
Managing Director and Secretary.

ONE of the few railway officers in Great Britain possessing a practical acquaintance with railway affairs on the Western side of the South American Continent, Mr. Bolden is able to boast of nearly 30 years' experience in South American railway affairs. Likewise there are but few residents in London who can vie with him in his knowledge of the social, political and commercial questions, appertaining to the part of the Western world in which he has specialised.

Mr. Bolden's career commenced in 1890 when he entered the London office of the Great Western of Brazil Railway Company, Limited, as a junior clerk. Promotion came rapidly. First he became Registrar and later Accountant to the company.

In 1907 the high capabilities of Mr. Bolden caused the directors of the Antofagasta (Chili) and Bolivia Railway Company, Limited, to offer him the Secretaryship of that important railway. Mr. Bolden accepted the position. Two years later he visited New York upon the affairs of the Bolivia Railway Company (a United States Corporation), after the Antofagasta Company had arranged to lease the former company's line in Bolivia, already constructed as a part of the large system of railways and to construct other lines under the scheme for account of the Bolivia Railway Company, and afterwards lease them. After successfully negotiating this intricate business, Mr. Bolden made an extended tour in Chili and Bolivia and thus became personally in touch with local conditions.

In 1917 Mr. Bolden was appointed London Manager of the Antofagasta (Chili) and Bolivia Railway and continued to act as Secretary of the company, but in June, 1918, he was elected to a seat on the Board and in addition to his duties as Secretary he was elected Managing Director.

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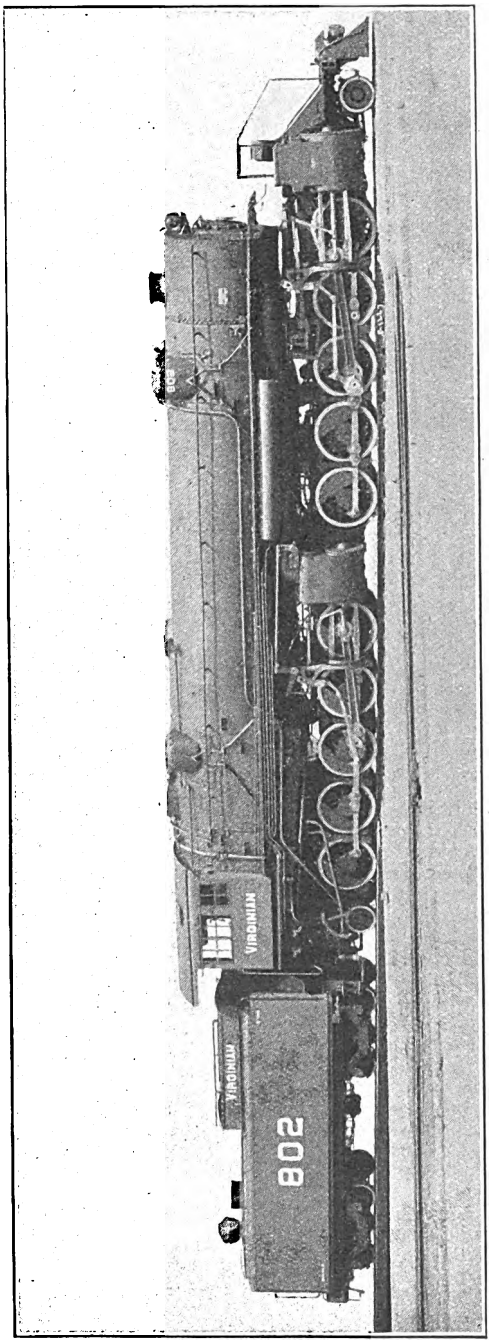
New Mallet Locomotives: Virginian Railway.



CLASSED as the heaviest locomotive engines in the world, the new Mallet locomotives supplied by the American Locomotive Company to the Virginian Railway, are at the same time, when working simple, the most powerful.

The wheel arrangement is 2-10-10-2, and the usual plan of driving the front group of wheels by means of the low pressure cylinders and the hind group by the high pressure ones is adopted.

Built for " pusher " service, the engines will be used at the rear instead of at the head of the trains. Their great power would test the couplings very severely if the locomotives were coupled up in front as train engines. They will work in pairs on a single track section of the Virginian Railway, and a 2-8-8-2 Mallet engine will be employed at the head of the train, the three locomotives being able to handle loads of 5,850 tons exclusive of their own weight. The following are the leading particulars :—

Cylinders, H.P., diameter ..	30 in.
,, L.P. ,, ..	48 in.
Piston stroke	32 in.
Coupled wheels, diameter ..	4 ft. 8 in.
Wheel base, coupled, each group	19 ft. 10 in.
Wheel base, engine	64 ft. 3 in.
Boiler, diameter inside ..	8 ft. 9v in.
Working pressure	215 lb.
Heating surfaces—	
Tubes	5,580 sq. ft.
Flues..	2,510 ,,
Firebox	437·5 ,,
Arch tubes	78·5 ,,
Total	8,605 ,,
Superheater	2,120 ,,
Grate area	108·7 ,,
Weight in working order (engine)	305 tons 7 cwt.
Engine and tender	401 tons
Adhesion weight	275 tons 9 cwt.

The locomotive develops a tractive power, working simple, of 176,600 lb. and 147,200 lb. when working compound The factor of adhesion is 4.19. The tender has a water capacity of 13,000 gallons and a fuel space of 12 tons. We shall hope in a later issue to refer to these engines and their work in greater detail.

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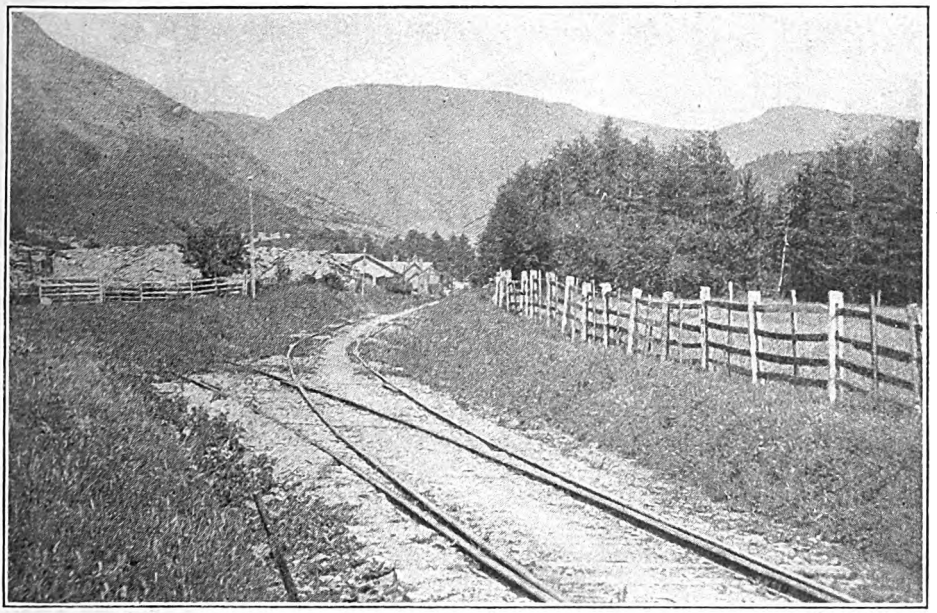
The Mawddwy Railway.

By T. R. PERKINS.

(*Continued from page 379, Vol. XLIII.*)

RETURNING from our inspection of the rolling stock and station, we found *Disraeli* attached, bunker foremost, to a train of goods wagons, and took our places on the footplate with the driver and fireman. On arrival of the mail-bag from the local post-office we promptly set off, and jogged comfortably along towards Cemmes Road. The back of the cab being provided with three windows instead of the customary two, we were enabled to obtain an excellent view of the line ahead, and of the delightful scenery through which it passes. No small amusement was caused by the antics of several sheep which had strayed on to the line, and which persisted in running ahead between the rails, compelling us to travel at a very low speed to avoid running them down. Again and again the whistle was blown, its only effect being to send them scampering ahead in terror, but not—as was hoped—to drive them to one side. After about a mile of this excitement, one of the sheep made a dart for a gap in the hedge, being promptly followed by its companions, when *Disraeli* quickly forged ahead. Near Aberangell we stopped at a wayside tank at a point where a hill rises sheer above the line, and replenished the saddle-tank; and on arrival at the foot of the 1 in 40 incline approaching Cemmes Road a halt was made again to divide the train, half being taken up and shunted into the siding, and a return then made for the remainder.



Photo] [*S. H. Bailey.*

MAWDDWY RAILWAY.

View from the junction of the Minllyn Slate Quarry Siding, looking down the incline to Dinas Mawddwy Station. Photographed before the closing of the line.

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It was interesting to note how the rotten permanent way yielded under the weight of the engine as it passed, compelling in places the reduction of speed to a mere crawl. At Cemmes Road we said farewell to our friends the enginemen, who set out almost immediately on the return trip; and thus ended our first and last experience of travel on the (independent) Mawddwy Railway.

Nearly six years later, hearing that reconstruction was likely to be taken in hand, I walked over the line, which had then been entirely disused for more than two years. Progress was not easy, owing to bundles of brushwood having been placed across the track in places, while at certain points—as already mentioned—the line was almost impassable through defective drainage. On arrival at Dinas Mawddwy I continued my walk to strike the Cambrian again at Dolgelley; the scenery was glorious, but the rain came down in torrents, making the journey far from enjoyable.

During the reconstruction, by the courtesy of the Cambrian Railways, I was taken over the line by the assistant-engineer, Mr. J. Williamson, to whose courtesy I am much indebted for a thorough inspection of the work. We travelled on the footplate of a little Cambrian saddle-tank—not unlike the *Mawddwy*—that had once belonged to the Van Railway; and it was curious to note that the ballast then being laid down on the line was formed of refuse from the Van lead mines—an excellent weed-killer, I was told.

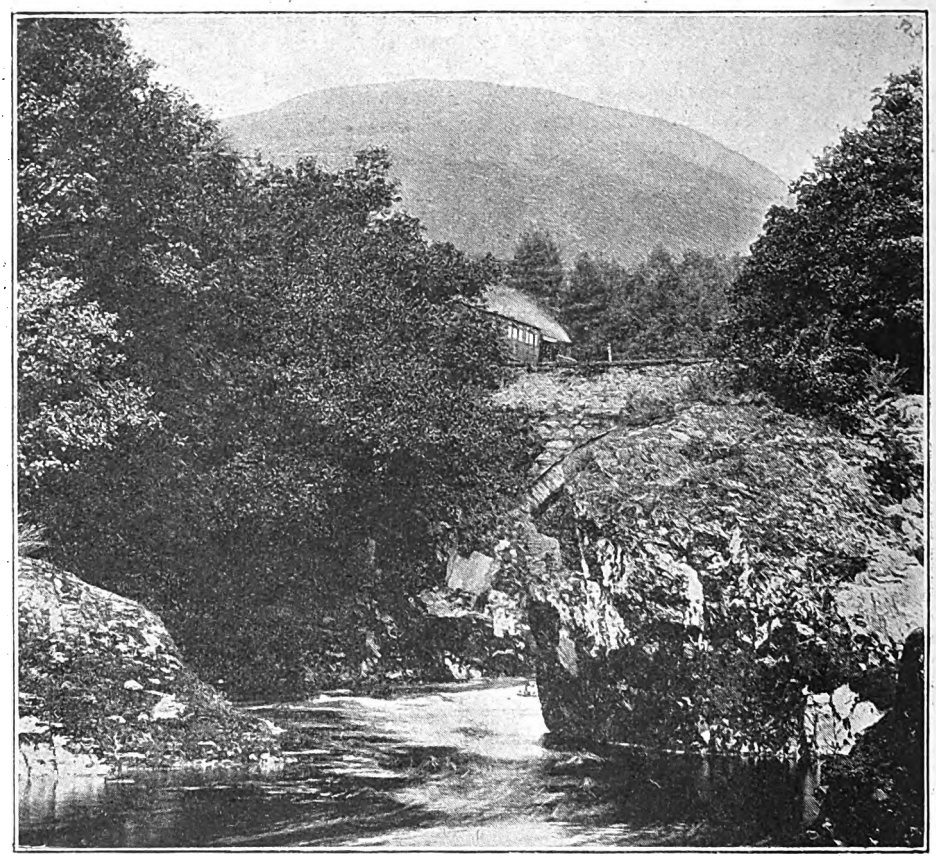

Photo.] [*S. H. Bailey.*

GORGE OF THE RIVER DOVEY NEAR MALLWYD STATION.
Portion of a train can be seen in the centre of the picture.

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In place of the old Vignoles track, standard chaired rails that had already seen duty on the main line were being put in; hedges had been cut down and trimmed, and the line already wore a much smarter appearance. Bridges over the Rivers Twymyn and Dovey were in process of rebuilding or strengthening, and it was evident that the line would soon be ready for re-opening.

Being unable to attend that function, I was anxious to see what changes had been made in working, and accordingly travelled to the district in 1913. On arrival at Cemmes Road, however, I discovered to my consternation that I had had my journey for nothing; during the previous night a severe storm had caused the Dovey to overflow, and the valley was under water to such an extent as to prevent entirely the running of the trains on the Mawddwy line. There was nothing for it but to return by the next train—Cemmes Road is not the most exciting spot on earth—and to stifle my disappointment as best I might. Two years later I was more successful, and was at last—after 15 years of waiting—enabled to gratify my ambition by travelling to Dinas Mawddwy in a passenger train.

The Cambrian Railways work the line with a small 2-4-0 side-tank engine, the train consisting of the older type of 4-wheeled coaches; these, however, are comfortably upholstered, and travel very smoothly over the now well-laid track. Tickets—of the tram pattern—are issued and collected by the guard, and the pre-war third-class fare averaged 1½d. per mile; it was realised that it would be impossible to make the railway a paying concern unless the fares were fixed on a higher basis than that usual on other lines.

I have in my possession one of the tickets of the original company. A statement is printed thereon that "this ticket is issued subject to the conditions in the time-tables of the respective companies over whose lines it is available." Considering that it is purely a "local"—this recalls the former practice of the London and North Western Railway, who until about 25 years ago used to print on every third-class ticket issued by them the statement that it was "not available by Irish mail"; the qualifying addition, "unless stated therein to be so"—*i.e.*, in the time-tables of the railway—rather added to than detracted from the absurdity of the situation when the ticket happened to have

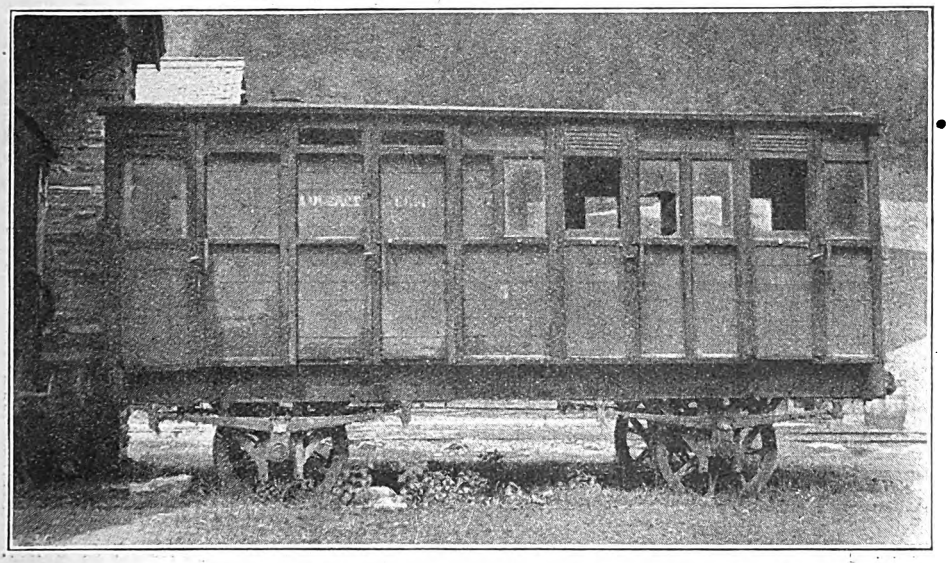

Photo.] [*Miss H. L. Bailey.*

OLD THIRD-CLASS CARRIAGE AT MAWDDWY.

This vehicle, No. 5, contained two third-class compartments, one luggage and a guard's compartment.

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been issued between two small stations on some country branch far removed from the route of the express in question. The ticket is issued to "Dinas"; "Mawddwy" was the title adopted a few years before the closing of the line. The ticket is on card of a bluish-green colour.

A word as to the pronunciation of the place-names which occur in this article: these are always puzzling to an Englishman, and I have myself heard the railway designated by various names, ranging from "Maud-wee" to "Mudway." If our readers call it "Mouthy," pronouncing the *th* as in *thee*, they will not be far wrong; the accent in Welsh is usually on the last syllable but one, which is always a useful rule to remember. Cemmaes is "Kem-mace"; Aberangell, "Aberangle"; while Mallwyd is difficult to explain—perhaps it will suffice to call it "Mathloo-id," though that does not bring out exactly the sound of the Welsh *ll*.

In conclusion, we will, in imagination, take a trip over the line, noting as we pass the chief objects of interest. It is presumed that the intending visitor approaches the district by rail, as otherwise a mountain walk of at least 10 miles will be necessary: Dinas Mawddwy is that distance from Dolgelley, and considerably further from Llanfyllin, Llanfair Caereinion or Bala, which are the chief points from which roads converge upon the village. From North or West Wales the approach will be by Cambrian Railways via Barmouth or Aberystwyth; from Dovey Junction to Cemmes Road the combined route follows the course of the Dovey River, along a comparatively open valley. From all other parts of England and Wales passengers travel via Moat Lane, thence over the mountain section of the Cambrian main line, with glorious scenery on either hand, descending by steep gradients all the way from the summit to Cemmes Road; a glimpse of the Mawddwy line bearing away to the right may be obtained shortly before the station is reached. Although there has always existed a physical junction between the two lines, there is no clear run-through, and the stations are some 50 yards apart, that of the Mawddwy Railway being a terminus. The platform is short, and the station building little more

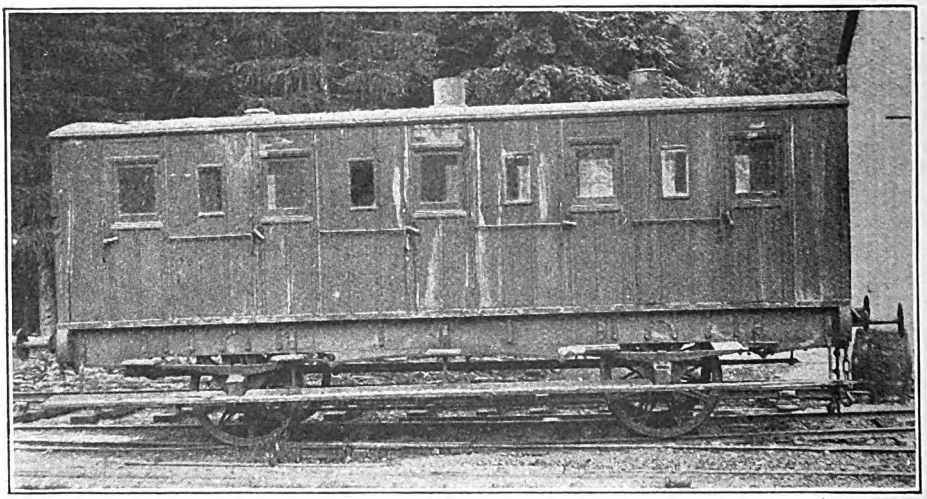

Photo.] [*Miss H. L. Bailey.*

OLD THIRD-CLASS CARRIAGE No. 2.

This vehicle was open from end to end, it was fitted with plain wooden seats without backs, only a wooden bar being provided to rest (?) the passenger's backs against, very low in roof, no brakes, colour (what remained) dull red, doors opened in the opposite way to the usual practice.

(The other side of this carriage was illustrated last month.)

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than a shed; the small booking office is not now in use. Immediately on leaving the station the railway commences to fall at about 1 in 40 to reach the level of the valley, the Cambrian line having been carried along the higher ground; a cutting, whose rocky sides are clothed with a profusion of ferns, heather, and other greenery, is passed through, and the train emerges on to the bridge crossing the little River Twymyn, a tributary of the Dovey. This bridge was rebuilt in 1911 on somewhat similar lines to that previously existing, but with girder spans; from the photograph of the latter, which appears on page 42, it will be seen that it was of timber and without parapets. It may be of interest, while on the subject of bridges, to mention that many of the smaller occupation bridges over which the line was carried merely consisted of stout baulks of timber bearing the rails, no flooring being provided. A long, straight stretch of the line extends to beyond Cemmaes station, immediately beyond which the Dovey is crossed on a low timber bridge of nine spans. At present the building is still standing, but renovated and smartened up by its new owners.

On leaving Cemmaes, the railway commences to follow the course of the Dovey, and the valley contracts considerably, and the scenery becomes more and more charming. After a while, steep hills rise abruptly on the left, while the river runs close on the right of the line, but many feet below. Several bridges span the track, carrying occupation roads; these are of timber, with stone abutments. From this point the journey is one of ever-increasing charm, the horizon being bounded on every hand by lofty wood-clothed hills, and the numerous curves bringing into view a constantly changing panorama. Approaching Aberangell, a glimpse is obtained of a pretty glen on the left, down which a little tramway brings the slates from three quarries to feed the railway; the village is picturesquely scattered about the sides of the hill. Aberangell station is still very much as it was before the reconstruction; as the guard issues tickets no elaborate buildings are even now necessary.

Onward to Mallwyd nearly every yard opens out some fresh prospect, while the river roars and tumbles over the rocks far below on the right. Here we noticed in

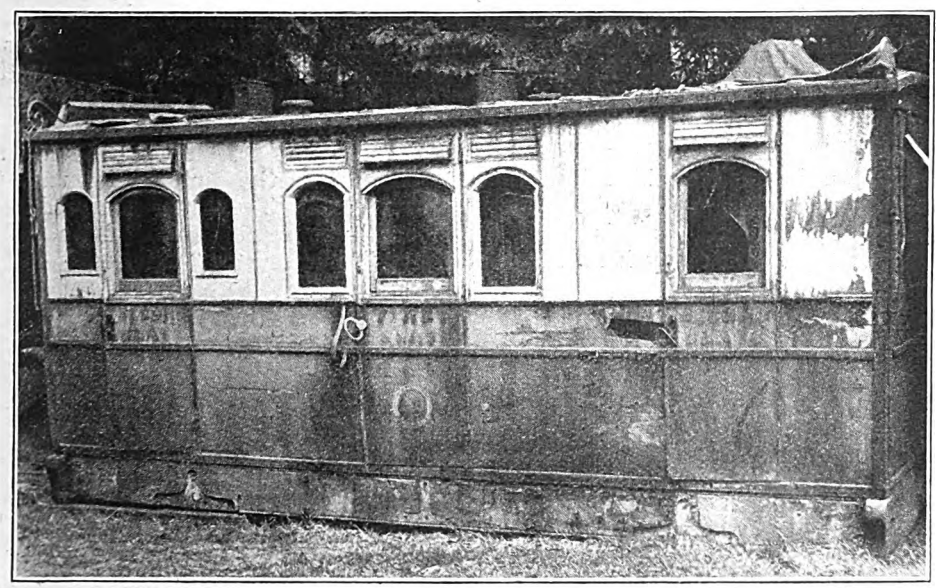

Photo.] [*Miss H. L. Bailey.*

BODY OF OLD COMPOSITE CARRIAGE.
Used as a tool shed at Mawddwy Station.

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1904 several gradient-posts still remaining; the gradients noted thereon varied from 1 in 64 to 1 in 911. Mallwyd station is the least imposing on the line, consisting merely of a platform and a name-board, but the village is of some importance. Here the Dovey flows close beside the line through an exceedingly beautiful gorge, and I am fortunate in being permitted to reproduce a photograph showing the river at this point, with a glimpse of the train passing above; *Mawddwy* and No. 4 carriage can be clearly distinguished.

A little further on the valley widens, and a magnificent view of the mountain background of Dinas Mawddwy is unfolded to the view. Soon the siding to the Minllyn slate quarries is passed, and a sharp descent brings the train to its terminus, half a mile from the village, and close to an interesting old bridge that here spans the river. The station is most picturesquely situated, and is itself of pleasing design. On every hand rise the hills, and the visitor with an eye for the beauties of nature will find much in the district to occupy his attention.

For the photographs which illustrate this article I am indebted to Miss H. L. Bailey, of Dinas Mawddwy, and to Mr. F. E. Fox-Davies, of Llanymynech, who accompanied me over the line in 1904.

[Since the first portion of this article appeared I have been informed by Mr. H. L. Hopwood of the Railway Club that the date of the Act should have been 1865 instead of 1866; also that the date of opening was October 1 1867. *Bradshaws' Manual* is the authority for this information. Another friend who has access to contemporary time tables informs me that for the first few years of its existence the terminus was known simply as "Dinas," the full name "Dinas Mawddwy" not appearing in the time tables until the "seventies." The name—as already mentioned—was again shortened (to "Mawddwy") in the later "nineties."—T.R.P.]

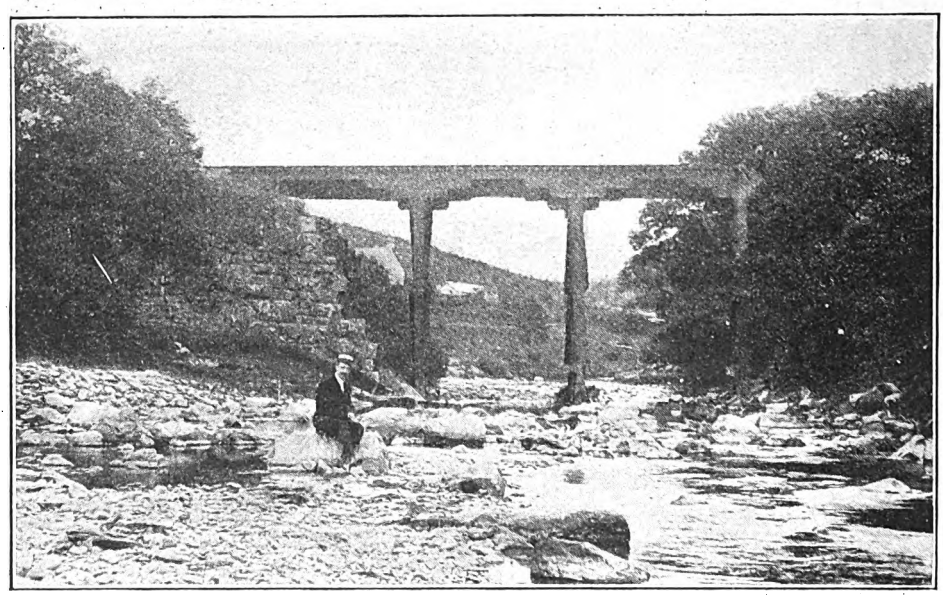

Photo.] [*F. E. Fox-Davies.*

MAWDDWY RAILWAY.

Wooden bridge carrying the railway over the River Twymyn between Cemmes Road and Cemmes stations. The bridge had no parapet or side rails. It succeeded a stone arch bridge and has now itself been replaced by a girder structure.

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A Famous "Dual-Identity" Locomotive Class.

By C. J. ALCOCK.

UNTIL the year 1863 the London and North Western Railway, in common with most other lines at that period, employed none but single-driving-wheel engines for passenger duties of all kinds. Indeed, although both four and six-coupled locomotives were running, they were invariably intended for hauling goods trains, and, if seen at all on passenger work, such use was always exceptional.

But with increasing loads, and particularly in view of the steep gradients on portions of the Northern Section, including the Manchester-Leeds line, as well as the Crewe-Carlisle route, Mr. Ramsbottom turned out from Crewe works in May, 1863, the first of a 2-4-0 main-line class of passenger engine with 6 ft. coupled wheels, known as the "Samson" class, that being the name given to No. 633, which inaugurated the design. Fifty were built, in successive series of tens, between May, 1863 and January, 1866. Then, soon after taking office at Crewe, Mr. F. W. Webb added 40 more, the first, No. 285 *Phalaris*, in September, 1873, the last, No. 1168 *Cuckoo* being completed in July, 1879.

They were but small engines, it is true, and even in their hey-day seem to have been regarded more as useful general-traffic engines, than as main line successes. In fact, Mr. Ahrons referred to them a few years ago in these pages as "effete," and various other terms, not altogether complimentary, have been used concerning them. But, they filled a useful purpose in the locomotive economy of the London and North Western Railway of that period; and when their turn for rebuilding came round Mr. F. W. Webb produced what has proved a most successful series of engines.

Commencing in 1889 with No. 1045 *Whitworth*, a process of renewal was inaugurated, such renewal being of so drastic a character that virtually nothing was left of the original engines except the name plates, so that although nominally all the "Samsons" were rebuilt, according to the imprint on the name-plates, they were actually succeeded by entirely new engines.

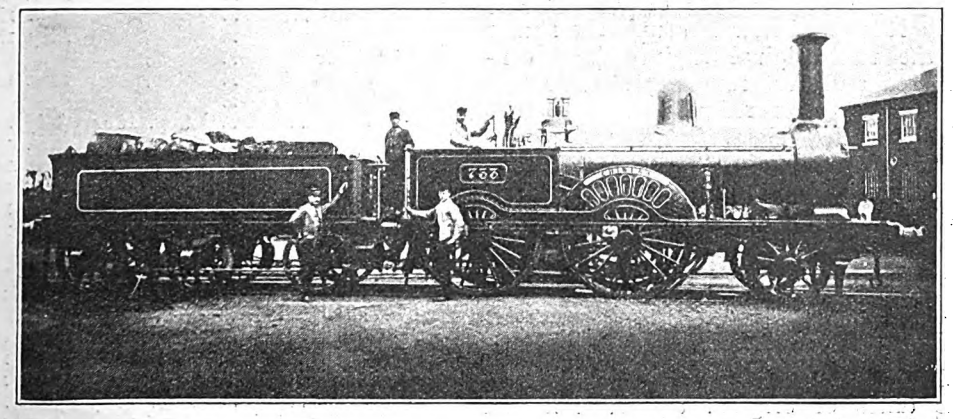

Photo.] [*Locomotive Publishing Co., Ltd.*

ENGINE No. 733, "Chimera."
As constructed by Mr. Ramsbottom.

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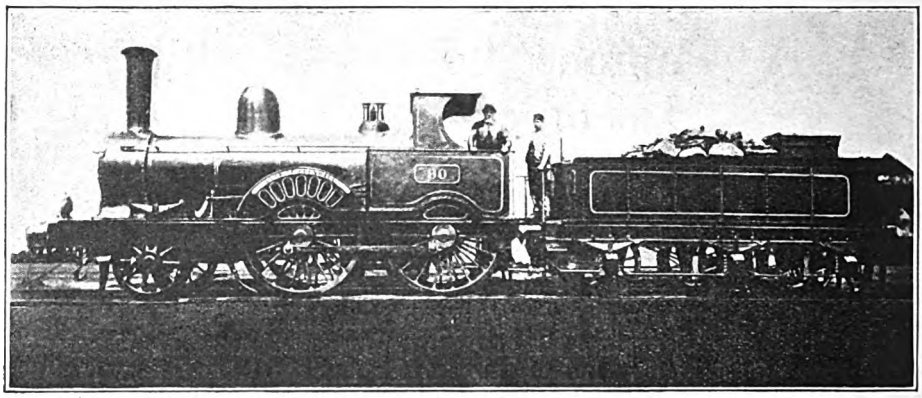

Photo.] [*Locomotive Publishing Co., Ltd.*

ENGINE No. 90, "Luck of Edenhall."
As modernised by Mr. Webb.

It is as a result of this renewal that the class achieved fame, and it is for that reason that the term "Dual-Identity" is adopted in the title of this article, while it is usual now to couple the names of the two original engines (first constructed and first renewed) *Samson* and *Whitworth*, or to refer to them as the "Whitworth" class. Incidentally, proceeding through the "Precedents," one can trace a direct lineage to the "Precursors" and "George the Fifths" of to-day, so that the introduction of this class constituted a distinct transition from old practice to the modern.

To complete these introductory remarks it will be sufficient to set forth the principal dimensions together with a list, and the dates of original construction and renewal.

No.	Name.	Date Built.	Date Renewed.
633	*Samson*	May 1863	Jan. 1890
634	*Ellesmere*	,,	Mar. 1893
733	*Chimera*	,,	Jan. 1890
735	*Charon*	,,	Jan. 1892
738	*Terrier*	,,	June 1890
752	*Glowworm*	,,	Mar. 1892
757	*Banshee*	,,	Jan. 1892
758	*Hardman*	,,	Mar. 1893
763	*Violet*	,,	,,
821	*Diomed*	,,	Jan. 1892
901	*Hero*	Jan. 1864	Oct. 1890
628	*Tartarus*	Feb. 1864	April 1893
724	*Eden*	,,	Mar. 1893
748	*Waterloo*	,,	Nov. 1889
764	*Shap*	,,	Mar. 1893
792	*Theorem*	,,	June 1893
793	*Martin*	,,	May 1894
902	*Onyx*	,,	May 1893
794	*Woodlark*	Mar. 1864	June 1893
795	*Falstaff*	,,	Mar. 1893
642	*Bee*	July 1864	Aug. 1890
731	*Croxteth*	,,	Nov. 1889
732	*Hecla*	,,	Jan. 1895
736	*Memnon*	,,	May 1894
737	*Roberts*	,,	,,
739	*Sutherland*	,,	Mar. 1893
742	*Spitfire*	,,	,,
828	*Tubal*	Aug. 1864	July 1890
829	*Turk*	,,	Jan. 1892
830	*Trent*	,,	Feb. 1893
81	*Greystoke*	Jan. 1865	Jan. 1892
401	*Zeno*	,,	June 1894
404	*Zopyrus*	,,	May 1894
418	*Zygia*	,,	April 1893
1045	*Whitworth*	,,	Sept. 1889
35	*Talisman*	Feb. 1865	Oct. 1890
36	*Thalaba*	,,	,,
124	*Marquis Douro*	,,	Mar. 1893
231	*Firefly*	,,	June 1890
419	*Zillah*	,,	June 1894
632	*Ostrich*	Dec. 1865	June 1890
609	*The Earl of Chester*	Jan. 1866	April 1893
746	*Castor*	,,	June 1894
814	*Henrietta*	,,	,,
817	*Constance*	,,	Mar. 1893
819	*Puck*	,,	April 1893
824	*Adelaide*	,,	June 1893
832	*Sansparei!*	,,	May 1893
934	*North Star*	,,	Mar. 1892
935	*Planet*	,,	May 1893
285	*Phalaris*	Sept. 1873	Mar. 1893
414	*Prospero*	,,	Sept. 1895
424	*Sirius*	,,	July 1895
444	*Typhon*	,,	Nov. 1890
445	*Ixion*	,,	April 1893
446	*Siren*	,,	June 1893
604	*Narcissus*	,,	Nov. 1890
635	*Zamiel*	,,	Jan. 1890
636	*Eclipse*	,,	May 1893
805	*Caliban*	,,	June 1893
90	*Luck of Edenhall*	Oct. 1874	June 1894
434	*St. Patrick*	,,	June 1893
468	*Wildfire*	,,	June 1894
469	*St. George*	,,	June 1893
485	*Euxine*	,,	,,

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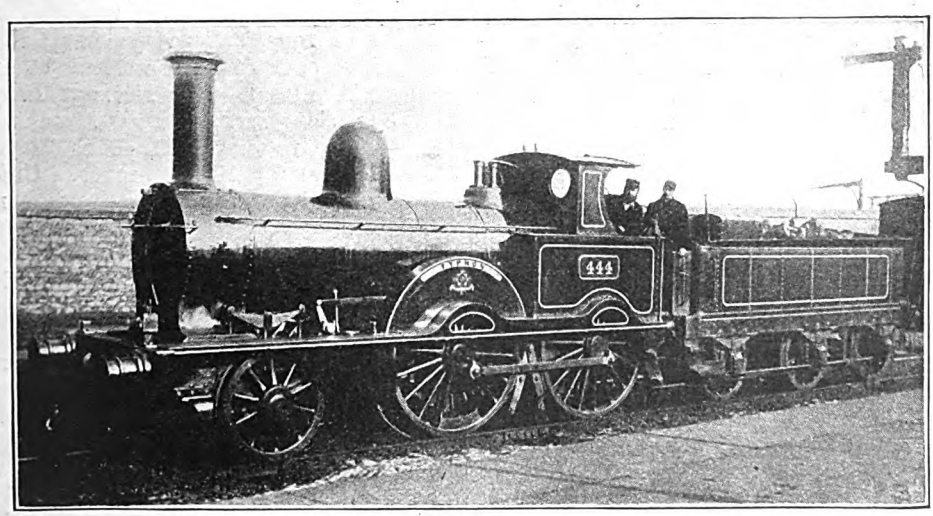
No.	Name.	Date Built.	Date Renewed.
486	*Skiddaw* ..	Oct. 1874	June 1893
487	*John o' Groat* ..	,,	Aug. 1895
631	*Hotspur* ..	,,	Jan. 1896
885	*Vampire* ..	,,	,,
1163	*John O' Gaunt*	,,	Feb. 1895
2150	*Atlas*	Nov. 1874	June 1893
2151	*Baltic*	,,	Nov. 1894
2152	*Sybil*	,,	June 1894
2153	*Isis*	,,	June 1893
2154	*Loadstone* ..	,,	May 1894
2155	*Liver*	,,	Nov. 1895
2156	*Sphinx*	,,	Jan. 1895
2157	*Unicorn* ..	,,	Dec. 1895
2158	*Serpent* ..	,,	Jan. 1895
2159	*Shark*	,,	May 1894
209	*Petrel*	May 1879	Aug. 1895
263	*Pheasant* ..	,,	,,
479	*Mastodon* ..	,,	Mar. 1892
773	*Centaur* ..	,,	July 1895
852	*Kestrel* ..	,,	Feb. 1895
995	*Medea*	,,	,,
1162	*Saddleback* ..	,,	June 1893
1164	*Odin*	,,	Feb. 1895
1166	*Wyre*	June 1879	Jan. 1896
1168	*Cuckoo*	July 1879	,,

As first built the "Samsons" had cylinders 16 in. × 20 in., coupled wheels 6 ft. 3 in. diameter, leading wheels 3 ft. 9 in. diameter, steam pressure 120 lb. per sq. in., total heating surface 1083 sq. ft. After renewal, corresponding dimensions were :—cylinders 17 in. × 24 in., pressure raised to 150 lb per sq. in., heating surface 1102 sq. ft., the diameter of the wheels being the same as in the original. The renewals also had longer wheelbase, new frames, new Allan link motion in place of the old Stephenson link motion and enlarged boilers.

In their original form, as illustrated by No. 733 *Chimera*, they had cut-out splashers, no enclosing cabs and the usual characteristics of North Western practice of the period. The view of No. 90 *Luck of Edenhall* shows the class somewhat modernised by Mr. Webb, this being one of the 40 built by him to Mr. Ramsbottom's original design. This had a standard cab, but retained the cut-out splashers. The third view of No. 444 *Typhon* represents the last condition of the original series, with closed splashers, but still suggesting the small dimensions of their design. No. 631 *Hotspur* is representative of the renewed engines, and comparison with preceding illustrations will enable many of the differences to be noted, particularly in regard to the size of the boiler in relation to other parts; though superficially it would be easy to class *Typhon* and *Hotspur* as actually, as well as nominally, of the same design.

It has been mentioned that the "Samson" class were the first four-coupled main line passenger engines on the London and North Western Railway, and it is somewhat strange that, both as built and as renewed, they gave rise to another class which has achieved even greater fame. Reference is made to the "Newtons," which, as first introduced by Mr. Ramsbottom in 1866, were developments of the "Samsons," but with larger boilers and 6 ft. 6 in. coupled wheels, and, like their progenitors had a somewhat in-



ENGINE No. 444, "Typhon."

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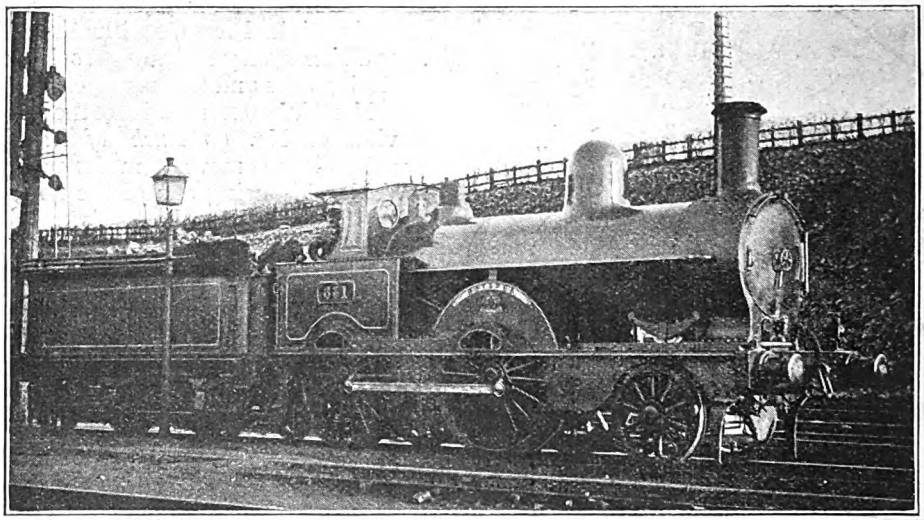

Photo.] [*R. E. Charlewood.*

ENGINE No. 631, "Hotspur."

vidious reputation. Then, when taken in hand by Mr. Webb and virtually renewed as the "Precedent" class, very much in the same way as the 6 ft. engines, they were metamorphosed into what is, perhaps, the most wonderful series of engines which ever operated relatively heavy and fast express traffic on a great main line.

Moreover, in combination the "Precedents" and "Whitworths" realised a wonderful reputation for locomotive performance. In their early days the "Samsons" took a share in working the Anglo-Scottish expresses over the Crewe-Carlisle main line, but later it became a common practice to run a 6 ft. 6 in. and a 6 ft. together on these trains. It was these combinations, lasting well into the present century, that gave so many notable records on the steeply graded northern main line.

That the "Precedents" were "greyhounds" is universally admitted; but that the 6 ft. engines should so often be coupled with them in that connection is somewhat remarkable.

With an engine of each class it was, for a long period, a usual thing for the heaviest Scotch expresses of the later years of the 19th century, and the early years of the present one, to perform wonderful speed work.

The late Mr. Rous-Marten, who called them "wonderful little engines," recorded speeds for such combinations touching up to 88 m.p.h. on the down grades of the north, while speeds of 80 m.p.h. were common.

It was, however, as secondary main line engines that the 6 ft. class were principally employed, and on such duties they were found practically all over the system. More particularly was the Liverpool-Manchester-Leeds line a special preserve of theirs, and at one time the Leeds main line passenger engines were exclusively of this class. The writer has recollections of a fine run, made in the summer of 1903, on a very heavy Newcastle-Liverpool express worked by two of them from Leeds, when Nos. 231, *Firefly* and 832, *Sanspareil*, reached Manchester (Exchange) in two minutes under the hour, 43 very difficult miles. Unfortunately, full details of the run are not available.

At one period several of the class were stationed at Abergavenny and worked trains over the Shrewsbury and Hereford line to Crewe and sometimes to Liverpool. No. 739, *Sutherland*, had this duty for a long time. No. 819, *Puck*, for some years worked the through London and North Western Railway train between Liverpool (Edge Hill) and Southport via Bootle and the Lancashire and Yorkshire Railway. They also frequently worked

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the Lake District and North Wales expresses from Manchester and Liverpool.

In the years immediately preceding renewal, the old "Samsons" were given odd jobs. Thus in 1893 No. 263, *Pheasant*, was working on the Aylesbury Branch, in one direction tender first, while No. 2157, *Unicorn*, was similarly engaged on the Watford-St. Albans service. No. 81, *Greystoke*, was stationed at Plodder Lane and worked London and North Western local trains between Bolton (Gt. Moor St.) and Manchester (Exchange). All the original 90 engines of the "Samson" class were withdrawn from service and scrapped between the years 1889 and 1896, with the exception of 10 which were kept for working the Engineers' Inspection saloons in the various districts. They in their turn are now being replaced by the renewed engines.

Upon the original No. 757, *Banshee*, being withdrawn from service in 1892, Mr. Webb fitted her experimentally with a friction wheel device in place of the usual coupling rods which were removed. The object was to combine the freedom of a single-driving wheel with the increased adhesion of coupled wheels. When required, the friction wheels on each side were raised, by a mechanical arrangement to contact with both of the large wheels so as to transmit power from the driving wheels to those which, ordinarily, would be coupled therewith. At other times the trailing wheels ran as carriers only.

For some time after renewal Nos. 2155, *Liver* and 2156, *Sphinx*, were stationed at Doncaster (G.N.R.) for working the first "fitted" goods trains operated by the London and North Western Railway between that point and Camden over the Great Northern and London and North Western joint lines.

The remaining "Whitworths" are now rapidly being scrapped and replaced by the modern superheated "Prince of Wales" 4-6-0 type.

And now a few remarks concerning nomenclature and individual engines. Two were involved in notable railway accidents; No. 418, *Zygia*, being concerned with No. 520, *Express*, an old compound, in the terrible accident to the West of England express at Chelford on Christmas Eve, 1894, while No. 2159, *Shark* was pilot to No. 275, *Vulcan* (6 ft. 6in.) in the accident to the Highland express on the Preston curve in July, 1896.

Two only were renamed, all the others retaining the same Nos. and names during their dual careers. No. 2158 originally bore the name *Serpent*, but when renewing it in 1895, Mr. Webb changed the name to *Sister Dora* in memory of Miss Dorothy Wyndlow Pattison, the devoted Walsall nurse, whose self-sacrifice will ever be remembered in that town.

This lady was born in 1832 in the village of Hauxwell, Yorkshire, of which her father, the Rev. Mark James Pattison, was Rector. Her ambition was to become a nurse and in 1864 she went to work in a Cottage Hospital at Walsall, the scene of her future life-work. In the course of these labours she caught first scarlet fever and then small-pox, but recovered and went on with her work. In 1875 a great small-pox epidemic broke out in Walsall in which her self-sacrifice and devoted exertions indirectly caused her death on Christmas Eve, 1878.

For some years No. 2158 ran daily through Walsall on a through London and North Western train between Derby and Birmingham, being shedded at Burton. It is interesting to record that although the name *Serpent* was an old one in North Western locomotive history, it has never been revived since.

The other engine renamed was No. 739, *Sutherland*.

When one of the new "Claughtons" of 1913 was named *Duke of Sutherland*, No. 739 was renamed *Ostrich* to avoid confusion; taking the name plate from No. 632 of the same class which was scrapped about that time.

Most of the names given to these engines were taken from the old Crewe goods and Trevithick engines which preceded them, and it is worthy of note that, contrary to the usual practice in later days, the old names and numbers remained coupled together. This accounts for the miscellaneous character of their nomenclature. Mythology, natural history and Shakesperean characters provide names for many of them; personal names, including a number of feminine, are also included. As some of the titles are sometimes wrongly attributed and their origin perhaps of interest, a few notes on this topic will fittingly conclude this article.

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Among personal names, besides *Sutherland*, which is of course, derived from the Duke of Sutherland, there is *The Earl of Chester* one of the titles borne by H.R.H. The Prince of Wales; *Marquis Douro* will be recognised as being one of the titles of the Duke of Wellington; *Hardman* and *Croxteth* are names well known in Liverpool; while *Whitworth* is, of course, named after the great Manchester engineer. *Greystoke* is a Baronial Hall in the Lake district. *Euxine* is the old name, still used in some quarters, of the Black Sea, and may be coupled with *Baltic*. *Saddleback* and *Skiddaw* owe their origin to well-known Cumberland mountains. *Eden* takes its name from the river so titled, while *Trent* and *Wyre* are also river references.

But the name which perhaps arouses most interest in regard to peculiarity, is that of No. 90, *Luck of Edenhall*. Both in the legend and on the engine name-plate Eden and Hall are combined as one word, but the family seat of the Musgraves near Penrith is generally known as Eden Hall. Reference is to a family heirloom—

> "The drinking glass of crystal tall,
> They call it the Luck of Edenhall;
> Should this goblet break or fall,
> Farewell the Luck of Edenhall."

To readers of a younger generation these engines are probably regarded as diminutive locomotives whose day is done and from which little of interest is to be expected. But in their prime the renewed class at least ranked as most useful machines, while the original series constitute an important link in the history of locomotive development; so that to the student of locomotive progress and history, and to the observer who remembers them as main line engines of the first rank, they constitute an important and interesting class well worthy of study and consideration.

LOCOMOTIVE AND TRAIN WORKING IN THE LATTER PART OF THE 19TH CENTURY.

Railways already dealt with in the "Railway Magazine" by Mr. E. L. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print except May.)
Great Northern: June, July, 1915. (Both out of print.)
Manchester, Sheffield & Lincolnshire: Aug., Sept., Oct., 1915. (Aug. out of print.)
Great Western: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Dec., Jan., Feb., June, July, and Aug., out of print.)
Glasgow & S.W.: Sept., Oct., 1916. (Sept. out of print.)
North Eastern: Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov. [and Dec., 1916, and Jan., 1917, out of [print.)
South Eastern: June, July, Aug., 1917.
Lancashire and Yorkshire: Sept., Oct., Nov., 1917.
London, Chatham and Dover: Dec., 1917. Jan., Feb., 1918.
Caledonian: March, April, May, June, 1918.
Great Eastern: July, Aug., Sept., Oct., Nov., Dec., 1918.

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The Thames Valley Line.

By W. J. SCOTT, B.A.

THE branch-line from Twickenham (or Strawberry Hill) to Shepperton was never an interesting bit of the London and South Western system; it runs through a flat and somewhat dreary region of Middlesex and its stations, even to-day, serve only *villages** of which the terminal one, which often gives its name to the branch, is perhaps the smallest. But it always had some peculiar features of its own, and when the suburban services at Waterloo terminus were electrified, the Shepperton trains were suddenly shifted from the "Windsor" section to the "Wimbledon-Kingston" one, leaving some 30 chains or so of the original line almost unused, while a spur-curve on which hitherto only one regular train a day ran (and that a Down only) became part of the through line, with some 36 trains each way over it daily; on week-days, that is, for on Sundays the old route (by Twickenham) alone is used.

There is a tradition to the effect that the Thames Valley line was first planned by an independent company, and was meant to form part—not of the South-Western but—of the Great Western system. This notion has something to support it in the undoubted fact that early in the sixties, a Bill was brought in for a line from the Great Western near Acton station to Twickenham. by way of South Ealing, &c. But no support to it was forthcoming from the authorities at Paddington, and it died still-born. [At the same time an "Acton and Brentford" Bill passed, for a line following exactly the same route till it curved off into the Southall-Brentford branch of the Great Western Railway, but of this scheme also nothing was ever afterwards heard.] Be this as it may, the Thames Valley Line when actually made was from the outset owned as well as worked by the London and South Western Company, though the rather marked type of station found at Hampton and "Sunbury"—with a good-sized house on the Down (or South) side of the line—this at first included the booking office, though chiefly used as the station-master's dwelling—is unlike the standard South Western Railway station of that date, with graceful curved "barge-boards" to the station-house. Otherwise, it had no independent features; it diverged from the Twickenham-Kingston branch just south of where Strawberry Hill station now stands, a junction-box (there was no station there in '65) being put at that point. Thence to the "Shepperton" terminus is a distance of a little over 6½ miles (perhaps 6¾ barely), so the length of the actual "Thames Valley" line may be taken as about 6 miles 50 chains. But the "branch" service (when there were any shuttle branch trains) was always to and from *Twickenham*, which adds nearly 1 mile to its length.

There are some curious features as to the way the line was taken, especially the distance of some of the stations from the places they were meant to serve, also in the terminal point chosen. A half-mile more would have brought the line (on a dead level bit of ground) to Shepperton village itself, instead of stopping short near to (but hardly in) the hamlet of Lower Halliford, where it terminates—to all seeming—in a potato-field, as if weary of going further in such country. Also, a slight inclination to the left (or east) for the last mile would have brought the railway to the foot of Walton bridge, and so within a bare half-mile of Walton-on-Thames. As that town lies nearly 1¼ miles north of the station called "Walton and Hersham" (which is really more than half-way from Walton town to the latter village) this would have given a station a good deal nearer to the town of Walton than the one on the main

* This does not now ho'd good of *Fulwell*, in so far as that station serves the new industrial suburb, which has g own out to that sta ion, and is named after it. Tedding on is a good-sized residential town but is chiefly served by a station on the Kingston (loop) Line,

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line, though of course the journey from London would have taken longer, owing to the many intermediate stops, than the average time by the main line.

In the 'Sixties, Kempton Park had not attained to fame as the well-known race-course, but was in private hands: even so the cost of cutting through any part of it seems to have been prohibitive, and the line instead of going straight from Hampton to Sunbury village, was carried north of Kempton Park. Hence Sunbury Station had to be put at a point quite a mile north of the place it was meant to serve; near (but not quite on) a direct road thither. The station so placed was close to the main Kingston-Staines Road—that thoroughfare crosses over the line just east of the station, but (following the plan of station-entrances on ground level which is one of the features of this branch) there is no access from the bridge; nor was there then any village or place near the station itself. "Fulwell" station was a riddle none might read, in more ways than one; there was no place of that name, to begin with; seemingly it was taken from a big house and grounds, whose main entrance lay some ¾ mile away on the road from Twickenham to Hanworth, &c.; two roads cross over the line a little east and west of the station (the former from Twickenham to Teddington, the latter from the same town to Hampton and on by Sunbury, &c., to Chertsey), but from either access to the station is by footpaths to the booking office or the foot-bridge, the platforms lying in a cutting about mid-way between the two turnpike-roads (the only case on this branch, of a station *not* on the ground level). Had the offices, &c., been on the bridge at the eastern end, it would have put the station nearer to Teddington; had the entrance been from the western end where, oddly enough, the line runs under the road—not by a bridge, but—by a tunnel! access would have been easier for Hampton Hill, the place which (at that date) the station was presumably meant to serve. (This tunnel, by the way, must be one of the shortest in Great Britain; it is not under any kind of hill, and why an ordinary over-bridge would not have done as well, no one can say.) Since Hampton Hill—usually called "New Hampton" in the maps—was a fair-sized village even in 1865, and the railway ran close behind it for its whole length, it is hard to see why this curious site was chosen for "Fulwell" station, about a ¼ mile north-east of one end of Hampton Hill, instead of a station at the latter village itself. The following table shows the names and whereabouts of the stations on the Thames Valley line when first opened, and their curious relation to the places they were meant to serve:—

Names of Stations.	Name of Place nearest to Station, etc. (In 1865.)	Distance in miles to village or place.	Notes.
Fulwell ..	Hampton Hill	about ¼ mile	[Nearly ¾ mile to Teddington village.]
Hampton	Hampton [on-Thames]	¼ mile	
Sunbury ..	Sunbury [on-Thames]	1 ,,	[Nearest place "Feltham Hill," about ⅔ mile N. of Station.]
Shepperton	Lower Halliford / Shepperton	about ¼ mile / ½ to ¾ ,,	

The branch was opened early in 1865 (in the March issue of "Bradshaw" for that year its table is found for the first time, but not among the other London and South Western pages; it has a bold heading "Thames Valley Line" in big black caps followed by the name of the owning company in lower-case type). At first there was no "junction station" except on Sundays, the new line being served wholly by *through* trains, of which there were seven each way, the last Down leaving Waterloo as early as 8.30 p.m.; gaps of *four hours* between trains were found both Down and Up (12 noon to 4.10 p.m. from Waterloo, and 1.15 to 5.15 p.m. from Shepperton). The 4.10 p.m. non-stop Waterloo to Mortlake, was the fastest either way, 50 mins. to Shepperton with 6 intermediate stops:—the 1.15 p.m. Up from Shepperton took 2 mins. more, though non-stop from Richmond into Waterloo: the 4.10 Down

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is of some interest as a train which ran to just the end of the century at the same time and (except for the opening of a new station) the same intermediate stops; in fact, but for a 5 mins. earlier start (Waterloo dep. 4-5) in 1901, it ran unchanged for *over* 50 *years*: until the "great upheaving" in fact of the new electric service. The Sunday service was a shuttle one from and to Twickenham from the outset; slowly this branch working spread to week-days also; the number of through London trains was never lowered, but the enormous gaps between these trains were filled by the branch shuttles between Twickenham and Shepperton. This process was not a rapid one; even in 1872 there were only two such trains each way, but it went on steadily, until early in the nineties the number of branch and of through trains was about equal (9 local and 9 London through Up). In fact, when some one grumbled to me at having "always to change at Twickenham," and I remarked that on an average, "every other train was a through one," the answer was "yes, every *other* train: never the one you're in." Which was smart—on the line of "jam every *other* day"—if not quite fair. Early in 1874 a passenger station was opened at Strawberry Hill (just north *i.e.*, on the London side of) the junction-point already existing there. This is said to have been a private construction by a local Baronet who wished to develop his building-estate†. Though it conforms to the "Thames Valley" type in being on the ground level, it really belongs to the Kingston branch (extended into the main line near New Malden (Coombe) station, with train services to Wimbledon for Ludgate Hill or Waterloo, a few years earlier). When first opened *none* of the Shepperton trains called there. Its obvious convenience as an exchange station between the two branches, and perhaps the growth of Strawberry Hill itself, soon wrought a change, and by 1877, almost all the Thames Valley trains called there. Having no sidings it never threatened to supersede Twickenham as the junction-station for either line; but near the end of 1895 it became the advertised starting-point of a morning Down train to Shepperton, making a sharp connection with a train the opposite way from Kingston (Just at Strawberry Hill and Teddington one can hardly speak of "Down" and "Up" but the train from Kingston was one to Waterloo via Twickenham, and the Shepperton Train was on the "Down" road on its own branch throughout.) Of course this train really started (empty) from Twickenham, it continued to run as a Strawberry Hill to Shepperton "passenger" up to the time of the great upheaval, and though it then vanished for a time, has since come to light again, at a much earlier hour, as the 4.58 a.m. from Strawberry Hill (in connection with the 4.29 a.m. from Wimbledon via Kingston); a queer survival—as we may call it—of an odd train.

Soon after the Thames Valley line was opened the owner of Kempton Park sold house and grounds to an association which turned it into the well-known "Kempton Park Race-course," one of the best known courses within the suburban area. To serve the patrons of this spot, who came in their thousands many times a year, a special "Race-course station" was provided, about ½ mile east of the one styled "Sunbury". Although chiefly used by race-specials, such of the regular trains as ran down near 1 p.m. and Up (say) from 4 to 6 p.m. or a little later, used also to call there on the race-meeting days. Thus, about the same time as "Strawberry Hill" was opened,—exact chronology is not aimed at in this article—another station was added to the Thames Valley stopping-places: though only used on some days in the year. "Kempton Park" had the platforms, &c., of a true "station," with a (provisional) signal box and even a small ticket-office, though there was no way in or out from or to any public road. It is said that the "Fulwell Curve"—now become the chief way to and from London—was first provided for the sake of this race-traffic; it did not much better the access to Kempton Park from the places west or south (as from the main line a "back-

† On this "estate" was built the curious village of Strawberry Hill, made up wholly of *villas*; though in the urban district, &c., of Twickenham it is quite a distinct place in itself. With the growth westward of Twickenham itself, Strawberry Hill Station has come to serve also the Twickenham Green—or Trinity—part of Twickenham town.

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shunt" at Malden, or probably Wimbledon, was still needful), but it did give an alternative and less-crowded way for London "specials," especially the non-stop ones.

Though the train service afforded on the Thames Valley line was not of a kind to draw a big development, especially in a region with few natural attractions, and some serious drawbacks, both Hampton and Shepperton villages tended to grow up to their respective stations; at Hampton the brick-and-mortar stream flowed across the railway (north-westward) and formed a villa suburb—"Marling Park, Stainhill Park," &c.—which it is said became mostly empty houses, and may since the war began, have filled up again. But the greatest permanent development was round "Sunbury" station where, with the Lincrusta-Walton factory as a kernel, a new village grew up partly residential or rural, but mainly industrial (looking like a fragment, shabby but considerable, of a Midland workmen's town). Its name was taken from the former "common" of which the last remains were swept away by the Thames Valley railway; to-day it seems as inappropriate a name as "Cradley *Heath*," but the postal authorities have fixed it. The mother-village on the river is now mostly styled Sunbury-*on-Thames*; from lack of a railway station there has been no growth there: a state of things the threatened invasion of the Central London Railway of a few years back was meant to set right. With the absorption of this Company in the "Underground" system the scheme came to naught, but it led to the electrification of the London and South Western suburban lines, with its wonderful increase in train facilities.

At Hampton Hill (the "hill" is not perceptible, but local usage is fond of the word in this neighbourhood—*e.g.* Feltham Hill) * there has been a gradual increase of houses, but the place remains one of the largest of its kind with *no station*, although the railway runs practically through it for over half-a-mile. The story goes that the local residents disputed as to which of the two road bridges was the better site for access to such a station, with the outcome that the Waterloo authorities settled the matter by building no station at all, but this is most likely a myth. It is true that Fulwell station is much nearer to one end of Hampton Hill than either Esher or Walton stations are to the places whose names they bear, but then—the railway goes no nearer Walton (and little nearer Esher) than the points where the stations have been put. Also, until the last few years, there seemed little reason why "Fulwell" station should stand where it did—and does—and not have been moved half-a-mile or so, to any of the aforesaid bridges at Hampton Hill. To-day it is too late for such a move; some time in the latter part of the 19th century Teddington developed somewhat suddenly into a considerable town (suburban in type, but undeniably a town), and grew steadily towards the west, until a workmen's suburb was built which almost touches Fulwell station, and has been named after it; "Northfields" (at Ealing) is a similar working-man's quarter.

With the beginning of the new century (taking 1901 as its first year) the before-mentioned curve was made; this was a quite short bit of line, from a new signal box ("Fulwell Junction") about 150 yards north of Fulwell station, to another new box ("Shacklegate Junction") on the Kingston branch about ¼-mile south of Strawberry Hill.† Apart from the Kempton race specials already spoken of, it was used for over 12 years by only one train one way, *i.e.*, Down, though as things turned out, it became the London through line for the Thames Valley branch. This one train was the 6.7 p.m. from Waterloo, running non-stop to Wimbledon, and calling thence at all stations to Teddington and (by the new curve) to Fulwell and all other Thames Valley stations, Shepperton, arrive 7.8 p.m., a somewhat slow journey even though the distance is 2 miles more than by Twickenham.

When the great change to "electric

* "Feltham Hill" is a hamlet of a few big private houses, about two-thirds of a mile due N. of "Sunbury" station; for some reason or other it is marked on almost all maps. Some of them also show *hill-shading* round it: the actual rise there is about *three* feet.

† In the triangle of ground thus formed a new *engine-shed* was made, instead of the small one hitherto existing in Twickenham station; the new shed served as a "stable" for the branch engines.

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trains" took effect, in the spring of 1916, (among other changes) a service of "roundabouts" at 10 to 20 min. intervals, Waterloo via Wimbledon, Kingston and Teddington, Twickenham, &c., back to Waterloo (and *vice-versa* out via Richmond, and home by Wimbledon), was put on; between London and Twickenham the gaps of 20 mins. in the "roundabout" times were filled by half-hourly runs which ran round the "Whitton Curve" as between Twickenham and Hounslow and formed the old (steam) one which since 1865 had been run via Richmond, Twickenham and Strawberry Hill; with the small exceptions given below, the latter service suddenly ceased altogether. At the time it came to an end, the supply of trains was not a bad one, though the intervals were quite irregular (ranging from 15 min. to 1½ hours, Down; and 18 min. to 1 hour 20 min. Up); in November, 1915, there were 23 trains each way between Twickenham and Shepperton (one Down was empty

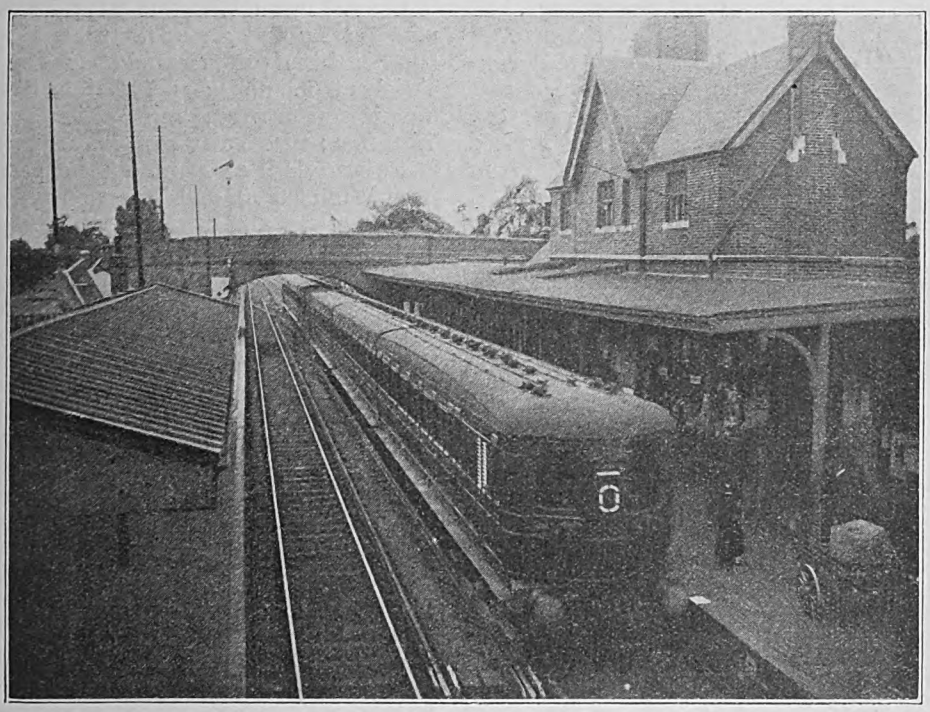

Photo.] [*F. H. Stingemore.*

LONDON & SOUTH-WESTERN RAILWAY.

Electric train at Hounslow and Whitton Station.

Up trains Hounslow to Waterloo, by Kew, Barnes, &c. To fill the like gaps on the Wimbledon-Teddington service, a half-hourly service from London to Shepperton (and *vice-versa*) was arranged, these trains completing the 10 min. service Waterloo to Kingston and Teddington, and then running by the "Fulwell Curve" on to the old Thames Valley line at Fulwell Junction box, and so to Shepperton and the intermediate stations. This service did not supplement but *replaced* from the former, but took passengers from Strawberry Hill onwards): the number included some very early ones which were practically "workmen's trains" though at full ordinary fares; about 10 each way were branch shuttles (two of these ran forward to or started from Richmond) all giving London connexions at Twickenham; the rest were through to and from Waterloo, including one Down which also had coaches for Windsor, but the engine worked from London to

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Shepperton, and the Windsor portion was uncoupled from the rear at Twickenham. The new electric service gave more trains as a whole, and also had the great advantage of *regular intervals*; but the sudden cutting off of direct access to all stations, Strawberry Hill to Wandsworth inclusive, especially to such towns as Twickenham, Richmond—a kind of local metropolis—or Putney, was not liked by the "Thames Valley" inhabitants. They could still reach these places by changing at Teddington, crossing over from the Up to the Down side both ways, but though the waits were short, there was of course no "correspondence" (or guaranteed connexion) between the trains there.

After some changes as to stops, &c. [at first the Shepperton trains passed Hampton Wick, but called at Clapham Junction and some at Earlsfield also] the service via Wimbledon has taken shape as follows:—

Down, *every half-hour* from Waterloo at 26 and 56 past each hour, 6.26 a.m. to 8.56 p.m.; and at 23 and 53 mins. past, from 9.23 to 11.23 p.m. [besides two early trains 5.9 a.m. from Wimbledon, and 5.53 a.m. from Waterloo]; from 6.26 a.m. to 8.56 p.m. the trains are non-stop to Wimbledon, pass Raynes Park, and stop everywhere from Malden inclusive: time on journey 32 mins. to Fulwell, 36 to Hampton, 40 to Sunbury, and 44 to Shepperton; the early and later ones call everywhere. Up, *every half hour*, from Shepperton 5.17 a.m. to 10.17 p.m. (also, terminating at Wimbledon, 10.47 and 11.17 p.m.): *stops* everywhere to Malden inclusive, and early and late trains everywhere else; from 6.17 a.m. to 10.17 p.m., after Malden, stops at Wimbledon and Vauxhall only: time on journey to Waterloo 46 mins. The number of intermediate stops (6 Down and 7 Up) between Fulwell and London is considerable, but the speedier quickening of electrically-hauled trains partly makes up for this.

By the old route, *two* trains each way arrived, in the "business" hours, both timed on the steam times, but afterwards quickened when worked electrically. Also *Down only*, there was an early train through from Waterloo, calling everywhere (this seems to have been electrically worked always) and the curious "local" from Strawberry Hill already spoken of. In October, 1918, these (old route) trains were timed thus: *Up*, from Shepperton 8.2. and 8.39 a.m., both stopping everywhere to Twickenham also at Richmond and Vauxhall, Waterloo arrived 8.43 and 9.29 respectively (the 8.2 a.m. passes St. Margaret's, but calls at Mortlake, the 8.39 has stops at St. Margaret's and at Barnes, but passes Mortlake); these are now the only Up passenger trains running over the few chains of the old Thames Valley line lying between Fulwell junction box and Strawberry Hill.

Down. From Waterloo at 5.7 and 6.7 p.m. (or 1.7 and 2.7 on Saturdays only), both calling at Mortlake, Richmond, Twickenham and then all stations beyond, Shepperton arr. 43 mins after leaving Waterloo; also, early morning trains from Strawberry Hill 4.58 a.m. (off the 4.29 a.m. from Wimbledon), and Waterloo 5.18 a.m. (Twickenham 5.48 Strawberry Hill 5.50), both stopping at all stations.

As the new way to "Thames Valley" stations—or what perhaps must now be called "the Shepperton Branch," as the uniform staff have long been accustomed to call it †—lies along the Southampton or Plymouth main line as far as Malden station (of course, on the "suburban," "local," or "relief" roads, whichever one may prefer to call them), these stations have been shifted from the "Windsor and Loop Line" section of the working time-book to the "Main Line" one; on the Hounslow line the "Whitton Curve" has taken the place of the Feltham track in much the same way, but this change does not involve a like transfer, which may be said to stand alone. The reasons for making the change are not wholly obvious, as shuttle trains off the hourly fasts (non-stop to Twickenham) for Reading, and the like ones (calling at Richmond) to Windsor would have given at least as fast a service from Waterloo (21 to 23 mins. to Twickenham and 17 mins. thence to Shepperton). It is true that the quite even intervals, with no change of carriage for London, should favour suburban development; but from local

† Some 12 years or more ago when we spoke to a porter of the "Thames Valley" train, he answered, looking rather puzzled, "Oh! you mean the Shepperton Branch"; although at that time the former name was given plainly on the official time-books.

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causes, the area is not a hopeful one for growth: in fact, between Sunbury and Shepperton—a section bearing an odd likeness to bits of the Midland and Great Northern Joint"—most of the line runs through an agricultural region which is not suburban. (A walk from Shepperton to West Drayton, by way of the Hallifords, the Spelthorne Inn, Spelthorne, Bedfont and Sipson, would lie almost wholly through open fields or rustic hamlets; at the end of April—or whenever the apple trees, &c., are in bloom—the views are not without beauty, though the ground is almost flat throughout).

In reckoning the "development" possibilities, a glance at the population of such urban districts as "Hampton" or "Sunbury" may have misled the powers-that-be at Waterloo. Hampton urban district—for example—shows the respectable total of 9,200 population; but this is made up of Hampton (on Thames) itself, Hampton Hill and most of Hampton Court, three quite separate places; Hampton Court, in fact, is really one with East Molesey on the Surrey side of the Thames; its railway station being officially known as "Hampton Court," that name is sometimes used for the place as a whole, whether in Middlesex or Surrey, though the station is actually in the midst of East Molesey. Hampton Wick, we may add, is virtually a Middlesex suburb of Kingston, though technically it is now independent, having an urban council and a civil parish of its own; it is of course ecclesiastically a "daughter-parish" to St. Mary's, Hampton, which once included Teddington in its wide-spread bounds.

For the sake of completeness, and for comparison with the table on page 26 a like table is added for the period (say) 1880 to 1900; to-day we might add to it the note that Fulwell station is "0 miles" from Teddington (Fulwell),

Names of Stations.	Names of places nearest to Station, 1880 to *circ* 1900.	Distance in miles to village or place.	Notes.
Strawberry Hill	Strawberry Hill	0 mile	Not served by "Thames Valley" trains since 1916 inclusive
	Twickenham (Green, &c.)	⅛ to ½ mile	
Fulwell	Hampton Hill	about ¼ mile	See note above as to "Fulwell" part of Teddington
	Teddington	about ⅓ to ¾ mile	
Hampton	Hampton [on-Thames]	0 to ½ mile	
Sunbury	Sunbury-Common	0 mile	
	Sunbury-on-Thames	1 mile	
Shepperton	Shepperton [Village]	0 to ¾ mile	
	Lower Halliford	¼ to ¾ mile	

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The Why and the Wherefore.

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-first annual edition of which is now out of print, but the new edition for 1919 is in preparation and it will be published in April next, price 5s. net, by post 5s. 6d. Every reader who desires a copy should order at once. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use.*

Proposed High-Speed Tube Railways.

There is no law to prevent a tube railway company building its line under private property. But where the rail level is less than 40 ft. below the surface the railway must purchase the land under which it passes. If the rail level is below this limit, purchase is not compulsory, but a payment to the ground landlord for "wayleave" is necessary. The cost of these wayleaves is not a big item, but there is a general feeling that for future tubes driven at a depth of 100 ft. or so, free wayleaves should be granted. The fairness of this contention is better realised when it is seen that the building of a tube railway increases the value of the property and land of the districts through which it passes, the full benefit of which goes to the ground landlord, and to the fact that tenants and leaseholders, even now, have no claim for compensation.

The routes of the proposed Kearney high-speed tube railways for London are as follows:—Australia House (Strand), with subway connection to the Temple station of the District Railway and with the Aldwych station of the Piccadilly tube; North Lambeth, subway connection with Bakerloo; Oval, subway connection with City and South London tube; Brixton, Herne Hill and thence as a surface railway to the Crystal Palace (High Level).

The other route commences with subway connection with the Oval station of the Crystal Palace line and runs to Vauxhall, connecting with South-Western Railway; Victoria, subway connection with the District Railway; Hyde Park Corner, subway connection with Piccadilly tube; Marble Arch, subway connection with, Central London tube; Edgware Road, subway connection with Bakerloo; Maida Vale; Kilburn, connection with North-Western Railway; Brondesbury, connection with Metropolitan Railway; Cricklewood, connecting with the trams running to Willesden Green, Edgware and Childs Hill.

There is also a possibility of this tube being extended in the south to Camberwell Green and Peckham. Such a line would form an important addition to London railways, as it opens up a new through route from South-East to North-West, and makes valuable connections with existing lines.

The tubes would be built on the Kearney high-speed system, by which lifts and escalators are dispensed with, the stations being just below the surface of the road. The connecting tubes between stations run down to a depth of 100 ft. or more, thereby permitting important economies in constructional and working costs, as well as allowing a great increase in speed.

Mr. Chalmers Kearney's time-table for the proposed new lines provides food for thought as to future possibilities in the new era upon which the world is now entering:—

Strand to Oval	...	3 minutes
Brixton	...	4½ ,,
Herne Hill	...	7 ,,
Crystal Palace		10 ,,
Camberwell Green to Cricklewood	... ...	14 ,,
Victoria to Cricklewood.		10 ,,
Marble Arch		3 ,,

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The first tube on the Kearney system is likely to be between Beresford Square, Woolwich, and the existing North Woolwich station of the Great Eastern Railway. The distance is just under three-quarters of a mile. The tube will be a single one in which one train will run backwards and forwards, each journey occupying only one minute. At present it takes half an hour to pass between the two points via the Free Ferry or the footway tunnel.

[Reply to "RIFLEMAN."]

Great Northern "Atlantics."

Engine No. 1421 is a four-cylinder compound, built at Doncaster in 1908, with high-pressure cylinders 13 in. by 20 in. and low-pressure 18 in. by 26 in., therein differing from the other Doncaster compound, No. 292, which has 16 in. by 26 in. low-pressure cylinders. Another point of difference is that the smoke-box of No. 1421 is recessed into the boiler barrel instead of extended forwards. No. 1300 was another four-cylinder compound, built by the Vulcan Foundry Company, Ltd., but has now been converted to a two-cylinder simple engine, with outside cylinders 20 in. by 26 in., while No. 271, which was a small-boilered four-cylinder simple, has now two inside cylinders only, 20 in. by 24 in. Conversely, No. 279, large-boilered 4-4-2, has been converted from the two-cylinder to the four-cylinder simple arrangement. Of the remaining "Atlantics" the numbers of those with small boilers are 250, 252–260, 949, 950 and 982–990 inclusive, and of the large-boilered engines 251, 272–278, 280–291, 293–301, 1400–1420 and 1422–1461, total 21 of the former and 90 of the latter, or, with the five engines above mentioned, 116 in all. According to the latest available records, the following of these engines are now superheated: 251, 253, 271–273, 279, 282, 287, 295, 298, 300, 301, 950, 982, 986–988, 1300, 1401, 1403–1407, 1409, 1410, 1412, 1416–1418, 1421, 1425, 1428, 1430–1432, 1434–1436, 1439, 1442, 1447, and 1452–1461, total 52 superheated "Atlantics."

[Reply to K. A. KINDON.]

Railways under Government Control.

Since the Government took over the railways in August, 1914, wages and salaries have been several times raised. Receipts, too, have risen enormously, owing to the 50 per cent. increase in passenger fares, the increase in the charge for season tickets and the much larger volume of traffic of all kinds carried.

At the end of the year 1916, the latest for which figures have been published by the Government, the paid-up capital of the railways of the United Kingdom amounted to a total of £1,349,219,000. The average rate per cent. of dividend or interest for the same year was 3.55.

The total receipts of the railways of the United Kingdom for 1916 amounted to; £154,468,000; expenditure, £102,521,000. The proportion of working expenditure to total receipts was 66 per cent.

[Reply to A. ST. JOHN TOWLER.]

Platforms at Aldwych and South Kensington Tube Stations.

The Aldwych branch was put in as a double road, with duplicate platforms at Aldwych, no doubt with a view to a southern extension at some future time. For this reason there is no connection between the roads at Aldwych, and the branch is worked as a single line, the north bound platform only being in use at Aldwych. With regard to South Kensington, when the Piccadilly line was constructed, sufficient work was carried out to make it possible to form a deep level line under the Metropolitan District Railway towards the Mansion House, a junction being made with the Piccadilly line at South Kensington. A part of what would have been the down District line and platform was constructed, as it would have been difficult to carry out the work later. Nothing further has, however, been done in the matter.

[Reply to "RIFLEMAN."]

Some Great Eastern Locomotive Queries.

Total heating surface of superheated 4-4-0 "Claud Hamilton" type engines amounts to 1,501 sq. ft. Principal dimensions of "1140" and "1240" classes of superheated 0-6-0 goods engines are:—cylinders, 20 in. by 28 in.; driving wheels, 4 ft. 11 in.; total heating surface, 1501 sq. ft.; grate area, 21.6 sq. ft.; working pressure, 160 lbs. per sq. in.; weight in working

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order, 47 tons 8 cwt. The latter are not the largest 0–6–0 engines in this country, as the "P 2" and "P 3" classes on the North Eastern Railway, the "J 22" on the Great Northern, and Class "30" on the Caledonian, among others, are heavier locomotives, although less heavily cylindered. To compare power on the basis of total heating surface, as you suggest, would be quite absurd, as it furnishes little or no measure of the actual tractive capacity of a locomotive.

[Reply to G. E. R.]

An Acoustic Problem on the L. & S.W.R.

Your reference to a peculiar "noise" made by some London and South Western Railway engines, like that of "an aeroplane engine or a siren," and appearing "to come from the safety-valves," is probably due to a very slight excess of steam pressure over that to which the valves are adjusted lifting the valves, while the spring immediately pulls them down again, the operation being repeated at rapid intervals, probably several times in a second. The effect is to produce a sound on somewhat the same principle as that of a reed in an organ. A slight continuous escape of steam through a confined aperature (*i.e.*, when the valve is only slightly open) would produce much the same result. Such musical efforts, of course, are by no means confined to the London and South Western Railway.

[Reply to C. L. B.]

Railway Level Crossing.

There are still several level crossings of two railways in existence in this country, the most important of which are the two examples on the Great Northern main line at Newark, where the Midland Nottingham-Lincoln line is crossed, and at Retford, where the Great Central East-West main line is encountered. The North Eastern Railway has a level crossing of its own at Brockley Whing, where a mineral route crosses the main line from Newcastle to Sunderland. There is no longer any similar crossing of the Great Western and Rhondda and Swansea Bay Railways at Port Talbot, as the latter line is now carried over the former by overbridge. As regards signalling, the box adjacent to the crossing, usually that of the company whose route was the first in the field, obviously must control both the lines.

[Reply to J. A. DICK.]

Dual-Braked Vehicles.

You are labouring under a misapprehension. The standard brake on both the Great Western and London and North Western Railways is the vacuum automatic, and the Great Western vehicles you have seen marked "Westinghouse Brake" are simply so labelled to indicate that they have the Westinghouse *in addition to* the Vacuum brake, and are therefore "dual-fitted" coaches. Dual fittings involve the complete equipment of each of the two brakes, with connecting hosepipes, on each vehicle concerned, and most companies, whatever may be their own standard brake equipment, have a large number of coaches so fitted, for convenience in through working.

[Reply to "NORTH WESTERN TRAVELLER."

Mishap at Forest Gate.

The recent mishap at Forest Gate Junction, Great Eastern Railway, did not involve any passenger train, nor cause any damage to locomotives. Some coaches of the 8.15 p.m. up "stock" train from Ipswich to London, drawn by 4–4–0 No. 1859, when crossing from the through to the local lines, fouled a light engine (No. 1207, 0–6–0 type) and were derailed, causing some damage to the track and considerable delay to trains on the following morning. Possibly the upsetting of the Great Eastern Railway Fenchurch Street train service may have caused the late running of the Midland (L.T. and S section) trains to which you refer, but we think it unlikely.

[Reply to G. AIANO.]

Highland Railway New Locomotives.

Weights of the new 4–4–0 and 4–6–0 Highland Railway engines given in the February and October, 1918, issues of the RAILWAY MAGAZINE, are inclusive of tenders, in working order. As the 4–4–0 engines have tenders of considerably larger capacity than those of the 4–6–0 engines, the aggregate weight in the former case is greater than in the latter-although actually the 4–6–0 engine without tender is heavier than the 4–4–0.

[Reply to JAMES DICKSON.]

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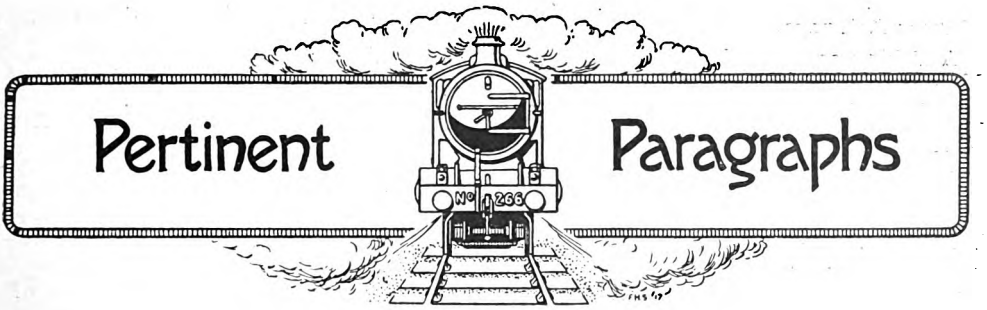

Our Colour Frontispiece.

WITH this month's issue we present a coloured plate showing the new Great Northern 3-cylinder 2-8-0 mineral engine, No. 461, designed by Mr. H. N. Gresley and built at Doncaster Works. The grey livery is that now adopted for all locomotives on the Great Northern Railway, save those engaged on express passenger service. This locomotive shares with its 2-cylinder sisters the distinction of being the heaviest tender goods locomotive at present working in these islands, weighing as it does 76¼ tons without tender, the nearest competitor being Mr. J. G. Robinson's new large-boilered "Consolidation," No. 412, on the Great Central Railway. Some indication of its massive appearance is afforded by comparison with the "crew" standing on the footplating.

No. 461 embodies the first experiment made by Mr. Gresley in 3-cylinder high-pressure propulsion, but this is not the first example of such an arrangement of cylinders, as Sir Vincent Raven has designed and built some 50 3-cylinder 4-4-2 express engines, 20 4-4-4 passenger tanks, and 10 2-8-0 shunting engines for the North Eastern Railway. The earliest 3-cylinder experiment, other than compound, was made by Mr. J. G. Robinson, of the Great Central Railway, in converting 2-cylinder "Atlantic" No. 1090, into a 3-cylinder engine. One of the principal features of Mr. Gresley's engine is that for the first time only two sets of valve-gear are employed for operating the three piston valves, the ingenious patent arrangement whereby this is effected having been fully described in the July, 1918, RAILWAY MAGAZINE

It is noteworthy that the photograph from which the oil painting of this engine was produced is from the camera of Mr. Charles S. Lake, the well-known author of that valuable little handbook "The Locomotive Simply Explained," and also of "The World's Locomotives," and other works on similar subjects.

Railways and Government Control.

INTENSE interest has been awakened by the announcement that the Government is considering the future working of the railways of Great Britain and Ireland on national lines as opposed to the continuance of the present private ownership.

A number of RAILWAY MAGAZINE readers have written requesting definite details and opinions on the subject, but until it is known precisely what are the proposals and the scope of the government's intentions it is impossible either to approve or disapprove of them.

If it is decided to purchase the railways a conservative estimate of the required figure calculated on the basis of the pre-war market prices for the existing securities would be £848,853,400. The nominal paid-up capital is approximately £1,360,724,500, and the income on the undertakings approximately £52,140,000 From our correspondence it would seem that very few RAILWAY MAGAZINE readers are in favour of railway nationalisation in any form that has up to the present been proposed by the various politicians who in the past have dealt with the subject. Whether a more favourable reception will be accorded the forthcoming suggestions remains to be seen.

Until the Nationalisation Bill has been drafted, or some authoritative forecast given by a responsible statesman it is futile to discuss points which the measure may or may not contain.

The huge increases consequent upon the war, in salaries and wages to railway officers and workers, coupled with the promise of reduced hours from February 1st, 1919, makes the reversion to precise pre-war conditions so far as the financial side of railways is concerned an impossibility.

Whatever is done we can but hope that wise counsels will prevail and that the ultimate outcome may be for the good of our nation and the country as a whole.

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Chinese Railways.

A Peking correspondent of the RAILWAY MAGAZINE communicates as follows :—

The Through Traffic Bureau of the Ministry of Communications began operations according to plan upon October 1st. This bureau is organized into four sections : General Affairs, Domestic Through Traffic Arrangements, Foreign Through Traffic Arrangements, and the Clearing House. The five principal lines of the Government railways now have through traffic arrangements upon Passenger traffic, and will probably soon make similar arrangements for Goods traffic. Similarly through traffic arrangements for passengers are in force between these five Chinese Government lines,

Mr. J. Lockhart,
Chief Accountant, Railway Clearing House, Ministry of Communications, Peking, China.

the Trans-Siberian Railway, the South Manchurian, the Chosen, and the Japanese Imperial Railways, and American steamship companies and certain trans-continental lines are expected to join in the near future. The clearing for the Chino-Japanese through traffic for the past five years has been under the jurisdiction of the Japanese railways. The Chinese now take this over for a period of five years. The clearing between the Chinese Government lines on domestic through traffic has been performed by the Peking-Mukden line for the past five years also. Instead of passing this over to another of the Chinese Government lines, the Ministry of Communications now takes it in hand as above set forth.

As Director of the Clearing House the Ministry has appointed the veteran Traffic Manager of the Peking-Mukden Line Mr. J. E. Foley. Mr. Foley began his railway experience 44 years ago in the clearing house at Dublin. He has been with the Peking-Mukden some 20 years, and prior to that for 16 years was connected with the Australian railways. Mr. Foley's task will be principally to facilitate the arrangements for through goods traffic with interchange of rolling stock. The actual work of the Clearing House will be in charge of Mr. J. Lockhart who has had the responsibility for it on the Peking-Mukden Line. Mr. Lockhart began railway life in station work upon the Caledonian Railway, working up through the office of the District Superintendent on the Western Division at Glasgow. There he came under the tutelage of the late R. M. F. Watson. He came to China in 1909 as Passenger Audit Clerk in the office of the Chief Accountant of the Peking-Mukden line. In 1913 when that line assumed responsibility for clearing the domestic through traffic accounts he was placed in charge. His promotion now to the enlarged work under the Ministry of Communications is, therefore, a logical sequence.

Railway Newspaper Amalgamation.

CONSIDERABLE interest has been shown, both in the railway world and in general press circles by the amalgamation of the two weekly railway publications *The Railway Gazette* and *The Railway News* under the title of *The Railway Gazette and the Railway News*.

The last issue of *The Railway News* as a separate newpaper appeared on November 30th. Since that date the amalgamated periodical has been published weekly, its characteristics covering the whole field of railway management, finance, engineering and operation at home and abroad. The joint Editors of *The Railway News* have joined the editorial staff of the combined undertaking.

Although amalgamations of this character are in accordance with the spirit of the present times the past has produced several corresponding combinations and it is remarkable that the newly-made amalgamation embraces through the incorporations of other days no less than half-a-dozen railway periodicals :—

The Railway Times, established 1837.
Herapath's Railway Journal, established 1839.
The Railway Record, established 1844.
The Railway Official Gazette, established 1870.
Transport, established 1892.
Railways Illustrated, established 1908.

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Economy in production is one of the causes of the combination and it is remarked that, as compared with 1914, the price of paper used in printing railway journals has increased over 555 per cent., printing charges 105 per cent., the cost of engravings 178 per cent., inland newspaper postage 300 per cent., to say nothing of other increased business costs. At the same time the price of neither of the periodicals nor the advertisement rates of either have been increased. For the future the combined publication will be sold at 1s. per weekly copy, and the prepaid subscription rates, including postage and special numbers issued from time to time, will be £2 2s. per annum.

The history of *The Railway News* as told in its jubilee number published in January, 1914, amply demonstrated the important part this periodical has played in the promotion of railway enterprise and the protection of railway interests. Founded in 1864 by the late Dr. Samuel Smiles, the well-known author of "The Life of George Stephenson," "Self Help" and other famous works, at that time Secretary of the South Eastern Railway Company, and the late Mr. Edward McDermott, *The Railway News* established a great and enviable reputation for sane and sound reasoning on all railway subjects.

Whilst keenly sympathising with the aspirations of railway employees for conditions of life suitable for its full enjoyment, *The Railway News* has had to keep before the public the interests of the railway shareholders, and has consistently endeavoured to be fair and straightforward in regard to both.

On the subject of the state purchase of railways *The Railway News* has performed yeoman service in removing many misunderstandings, while in respect of the proposed Channel Tunnel a prominent part was taken in bringing the project before the public at a time when the undertaking was regarded with widespread suspicion and unqualified disapproval.

In fact it is not too much to say that during the fifty years prior to the war than *The Railway News* there existed no stronger force in the United Kingdom for the promotion of right thinking in railway questions and honest dealing in railway affairs.

In railway operation, general working and engineering *The Railway Gazette* has during the past decade stepped right into the foreground. It has attained a position of eminence never previously occupied by a British railway newspaper. Thoroughness and enterprise have been its leading characteristics, and its general excellence is freely acknowledged throughout the railway world. Now that *The Railway Gazette* has joined hands with *The Railway News* and the twain has become one there lies before the combined publication a career of usefulness that cannot be over-estimated.

Following the war the policy of reconstruction is to the fore. So far as railway questions are concerned there is urgent need for plain and reliable expositions, week by week, by authoritative writers. In this connection, it is, we venture to predict, that the newly-made combination will prove not alone of the highest value to the railway industry and its allies, but beyond this it will become, and in the near future, a national asset of more than ordinary importance.

First Canadian-born Railway President.

Mr. Edward Wentworth Beatty, K.C., the new President of the Canadian Pacific Railway, has the distinction of having been born in the Dominion—at Thorold, Ontario, to be exact—some 39 years ago. He was educated in Canadian schools—the Model in Toronto, Upper Canada, Harbord Collegiate Institute, University of Toronto and the Osgoode Hall. His experience was Canadian—reading law with McCarthy, Osler, Hoskin and Creelman in Toronto; and his success has been entirely Canadian. He was called to the Bar in 1901, and one month later was made an assistant in the law department of the Canadian Pacific Railway. In four years he was assistant solicitor; in nine, he was general solicitor; in 12, he was general counsel; in 13, he was a K.C.; and in 14, a director in the place of Mr. David Nicoll, retired.

The "Daily Naval Special."

"The Silent Navy" has come into its own at last after four weary years of war, and the nation has not been slow in acknowledging the debt of gratitude which it owes to our splendid Fleet. Readers of the RAILWAY MAGAZINE may, therefore, be interested to have some details of the important part which the British railways have played in connection with it, and the valuable services the various Companies concerned have rendered in the transportation of officers and men, both on duty and on leave. It must be obvious to everyone that the enormous increase in passenger traffic entailed thereby required special provision to be made, particularly in the train service between London and the North of Scotland, where the ordinary service was altogether inadequate to meet the abnormal conditions. What is known officially as the "Daily Naval Special" has accordingly become an established feature on three of our important main lines, namely, the

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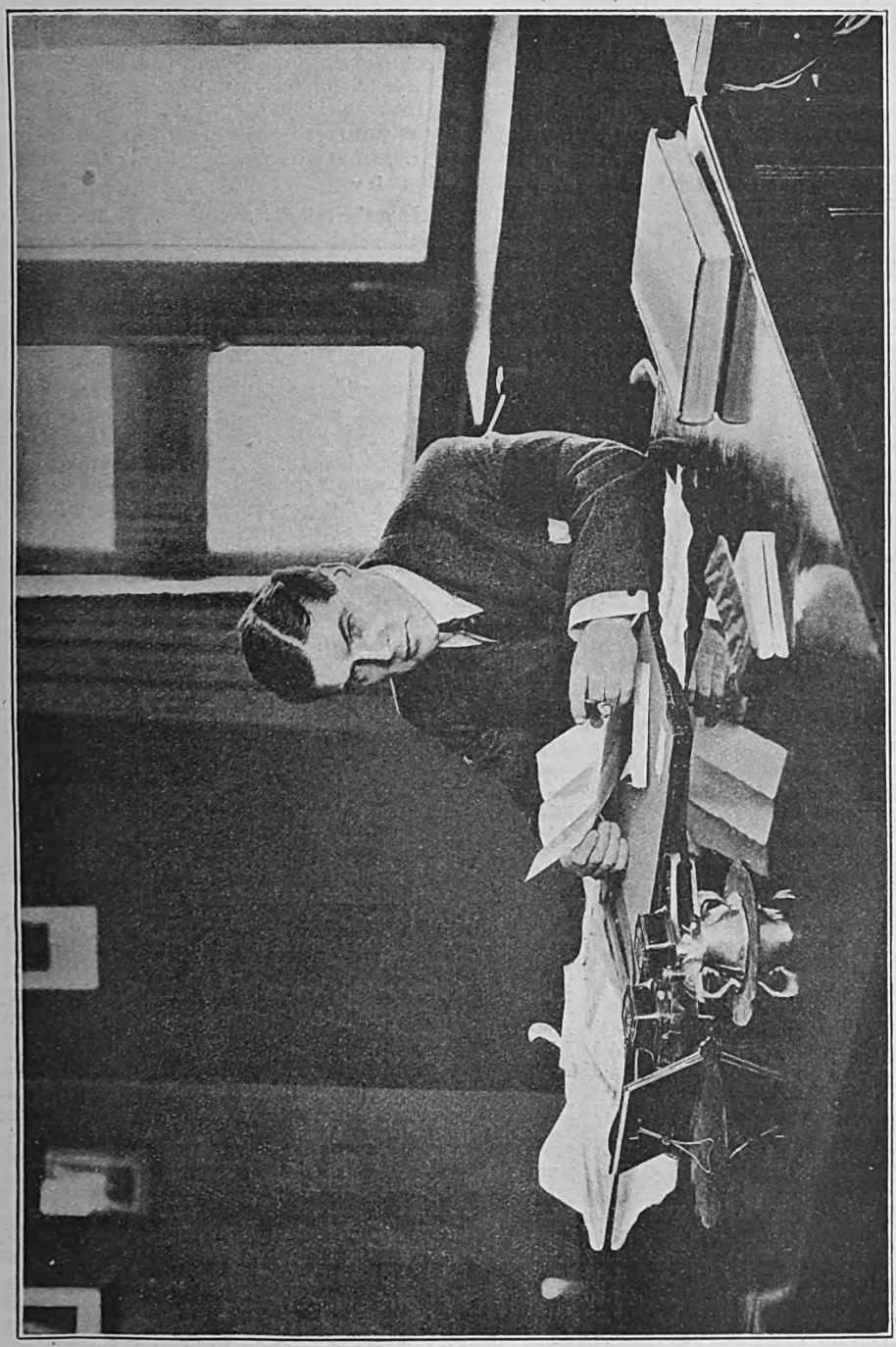

Mr. EDWARD WENTWORTH BEATTY, K.C.,
President of the Canadian Pacific Railway.

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London and North Western in England, and the North British and Highland in Scotland. The train in question runs daily (except Sundays) all the year round, in each direction, between London (Euston) and Thurso, and has proved of incalculable benefit to officers and men proceeding from the metropolis to various bases in the north and vice versa. With its through journey of no less than 716¾ miles it is easily the longest-distance regular train in the United Kingdom. The down run is the quicker of the two, occupying altogether 21 hours 45 minutes as compared with 22 hours 20 minutes for the corresponding journey from Scotland. The train is composed of London and North Western stock with a sleeping saloon attached, and the following is the time table at the time of writing (December, 1918).

London (Euston) leave ..	3. 0 p.m.
Crewe, arrive	6. 8 p.m.
,, leave	6.22 p.m.
Preston, arrive	7.28 p.m.
,, leave	7.31 p.m.
Carlisle, arrive	9.33 p.m.
,, leave	9.40 p.m.
Hawick, arrive	10.52 p.m.
,, leave	11. 0 p.m.
Edinburgh (Waverley) arrive	12.18 a.m.
,, ,, leave	12.38 a.m.
Inverkeithing, arrive ..	1. 5 a.m.
,, leave ..	1.11 a.m.
Perth (General) arrive ..	2.12 a.m.
,, ,, leave ..	2.20 a.m.
Inverness, arrive	6.40 a.m.
,, leave	7.15 a.m.
Alness, arrive	8.20 a.m.
,, leave	8.22 a.m.
Invergordon, arrive ..	8.29 a.m.
,, leave ..	8.32 a.m.
Thurso, arrive	12.45 p.m.

Thurso, leave	11.45 a.m.
Invergordon, arrive ..	4.25 p.m.
,, leave ..	4.28 p.m.
Alness, arrive	4.34 p.m.
,, leave	4.37 p.m.
Inverness, arrive	5.35 p.m.
,, leave ..	6. 5 p.m.
Kingussie, leave	7.45 p.m.
Perth (General) arrive ..	10.15 p.m.
,, ,, ...	10.25 p.m.
Inverkeithing, arrive ..	11.25 p.m.
,, leave ..	11.35 p.m.
Edinburgh (Waverley) arrive	12. 4 a.m.
,, ,, leave	12.31 a.m.
Galashiels, arrive	1.27 a.m.
,, leave	1.33 a.m.
Carlisle, arrive	3.10 a.m.
,, leave	3.20 a.m.
Preston, arrive	5.24 a.m.
,, leave	5.27 a.m.
Crewe, arrive	6.33 a.m.
,, leave	6.53 a.m.
London (Euston) arrive ..	10.5 a.m.

It will be noticed that on both journeys the train runs between Carlisle and Perth via the North British Railway and not over the continuation of the West Coast Route by the Caledonian Railway. This is in order to give connections to and from Rosyth Dockyard, for which purpose a stop is made at Inverkeithing each way. Through carriages are run between Euston and Rosyth Dockyard and vice versa, the times being as follows :—

Inverkeithing, leave ..	1.20 a.m.
Rosyth Dockyard, arrive ..	1.32 a.m.
Fleet Mail Office, arrive ..	1.47 a.m.
Fleet Mail Office, leave ..	10.45 p.m.
Rosyth Dockyard, leave ..	11. 0 p.m.
Inverkeithing, arrive ..	11.12 p.m.

Connections are also given from Rosyth Dockyard at 12.30 a.m. with the north-going train, and off the up train, arriving at Rosyth Dockyard at 11.55 p.m., but in these cases through carriages are not run, and passengers require to change at Inverkeithing.

On the down journey arrangements are made for supplying dinners at Euston, teas and "bag" suppers at Crewe, and breakfasts at Inverness; and dinner baskets may be had at Kingussie on the south-going train. The sleeping car is run between Euston and Inverness only, and berths therein are allocated by seniority. The trains are run exclusively for Naval passengers and Admiralty officials, and civilians of whatever standing are debarred from making use thereof unless in possession of a special permit.

Reference to the time-tables above will show that both the down and up trains are due to be in Edinburgh (Waverley) at the same time; also, the down train does not reach Thurso until an hour after the following up train has left: that is to say, two "up" trains are passed on the down journey.

In addition to the "Daily Naval Special," special Naval Leave trains are run when required on "standard timings" from Rosyth Dockyard to Plymouth via Edinburgh (Waverley), Carlisle, Crewe, Shrewsbury, Hereford, Bristol, Taunton, and Exeter, and to Portsmouth via the same route to Crewe, thence via Bushbury, Wolverhampton (G.W.), Birmingham, Leamington, Banbury, Oxford, Basingstoke, and Eastleigh, and *vice versa*; also between Invergordon and these bases, and from Invergordon and Rosyth Dockyard to London (King's Cross) by the East Coast route. The longest of these journeys is that from Plymouth to Invergordon, 721 miles by the West Coast

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route, and the times of one of the "specials" may be cited :—

Plymouth (North Road) leave	9.45 a.m.
Newton Abbot (conditional stop), arrive	10.40 a.m.
Newton Abbot (conditional stop) leave	10.42 a.m.
Exeter (St. David's) arrive	11.20 a.m.
,, leave ..	11.35 a.m.
Taunton, arrive	12.25 p.m.
,, leave	12.55 p.m.
Bristol (Stapleton Road) arr.	2.10 p.m.
,, ,, leave	2.30 p.m.
Pontypool Road, arrive ..	3.40 p.m.
,, leave ..	3.50 p.m.
Shrewsbury, arrive ..	5.50 p.m.
,, leave	6.30 p.m.
Crewe, arrive	7.20 p.m.
,, leave	7.35 p.m.
Preston, arrive	8.45 p.m.
,, leave	9.0 p.m.
Carlisle, arrive	11.10 p.m.
,, leave	11.50 p.m.
Perth (General), arrive ..	3.50 a.m.
,, ,, leave ..	4.30 a.m.
Inverness, arrive	8.50 a.m.
Invergordon, arrive ..	10.30 a.m.
Total time on journey :	24¾ hours.

Time is allowed at Taunton, Shrewsbury, and Perth for refreshments. A connecting train leaves Portsmouth Town at 11.50 a.m., and arrives at Crewe at 7.25 p.m., with booked stops at Basingstoke (1.30 p.m. to 2.10 p.m., time allowed for refreshments), Oxford (3.25 p.m. to 3.35 p.m.), and Birmingham (Great Western Railway) (5.10 p.m. to 5.40 p.m., refreshments). These trains are, of course, run only when specially arranged for, and the times are liable to alteration. The journey from Plymouth to Invergordon no doubt is a tedious one for "Jack," whether on leave or not, but, with no "connections" to worry about, he doubtless appreciates what the railways do for his comfort in transporting him all this way without a single change being necessary.

(For the times quoted the writer is indebted to the official Rosyth Pocket Time-Table, published by the Grand Fleet Fund, and the surplus profits from which are devoted to the Grand Fleet Emergency Fund for the immediate relief of men invalided from the Royal Navy and for the assistance of widows and orphans.)

Richborough and the Channel Train Ferry.

RAILWAY MAGAZINE readers generally will be interested in the two illustrations we are able to give relating to the Channel Train Ferry, which was instituted in 1917 to meet the demands of the military authorities and which plies between certain French ports and the newly-created Port of Richborough on the River Stour, near Sandwich, in Kent. The rise of Richborough as a great forwarding depot is one of the romances of the war and its selection was, we understand, entirely due to the Directorate of Inland Waterways and Docks, which was formerly the Inland Water Transport Section of the Royal Engineers. In a subsequent issue we hope to give further details of the creation of Richborough as a port and the institution of the cross-Channel barge and ferry services for the conveyance of military requisites—a work which has played a very important part indeed in the conduct of the campaign on the Western Front. In the meantime we append the following brief summary of an article which appeared in a recent issue of *The Daily Telegraph*.

Wharf construction on the Stour was begun in June, 1916, and so well did it progress that by December a regular service of barges was in full operation. From first to last upwards of 4,000 barge loads of ammunition were despatched from Richborough to the battlefields of France, the deadweight tons of guns, ammunition and ordnance stores conveyed in this way reaching the total of 784,741, while the Army Service Corps supplies amounted to 70,877 tons. On a single day in August last no less than 6,374 tons of material were towed across the Channel and thence despatched by means of the French canal system to depôts, established at no great distance from the firing line.

The train ferry came into existence in January, 1917, the French ports of Calais and Dunkirk being equipped with terminal facilities corresponding to those at Richborough. The steamers employed are 363 ft. 6 in. long and 61 ft. 6 in. broad, and their draught, when loaded, is 9 ft. forward and 10 ft. aft. They have a speed of 12 knots and displace 3,654 tons. The average load carried is about 900 tons and up to the end of the week ending October 23, the tons (deadweight) exported amounted to 185,786, and the tons (deadweight) imported amounted to 58,981. Large numbers of railway trucks, brake vans, locomotives, tanks, &c., were carried across, the work of loading up having proceeded with the utmost smoothness, the engines being taken over on their own wheels, and the tanks on the special railway trucks on which they had travelled from the works. By this means an immense saving was effected in time, labour and expense, and there is no doubt that the ferry—to quote the words of one of the many correspondents who have lately written about it—"added enormously to our facilities for quick transport during critical months of the present year in France, and it will probably continue to render valuable service in the coming demobilisation."

The Richborough undertaking owed its

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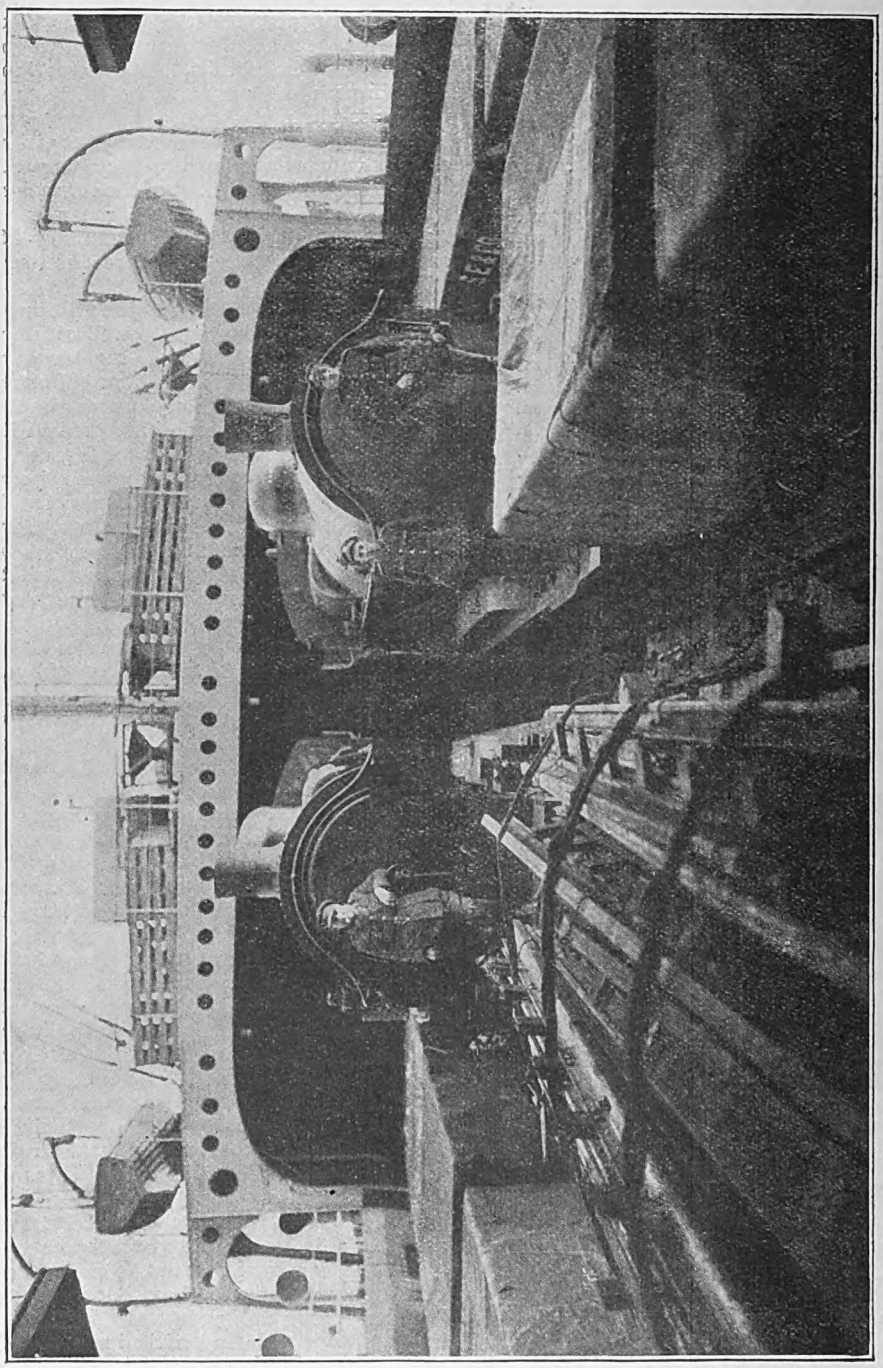

RICHBOROUGH AND THE CHANNEL TRAIN FERRY.
Rolling-Stock for the Western Front.

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inception to the I.W. and D. *régime* at the War Office, under Major-General (then Brigadier-General) A. S. Collard, C.B., C.V.O., who was followed by the present Director of the I.W. and D., Brigadier-General A.S. Cooper, C.M.G., general manager of the Nigeria Railway. The present commandant at Richborough, who has been on the site since its infancy, is Brigadier-General A. J. Allen-Williams, C.M.G., chief agent and engineer for Hong-Kong Harbour Works contractors. With this undertaking should also be associated the names of Sir Guy Granet and Sir Sam Fay, successively Directors-General of the Movements and Railways Branch of the War Office, also Mr. J. Percy Clarke, late general manager of the Buenos Aires Great Southern Railway, and latterly Mr. Oliver R. H. Bury, formerly general manager of the Great Northern Railway—the last two gentlemen having given most valuable assistance as Honorary Deputy Directors of the Inland Waterways and Docks Directorate.

Railway Engineering Training.

IN the November, 1918, RAILWAY MAGAZINE, information was included for the guidance of readers "of the rising generation" who desire to become locomotive engineers, but there are others to whom the civil engineering side of railway life makes a strong appeal, and for the use of young men with ambitions in this direction the following facts are cited.

Practically all the civil engineering departments of railways in Great Britain accept pupils, but the conditions vary almost with every company. Some railway companies take pupils direct, *i.e.*, their indentures would be such that the conditions of their apprenticeship would be quite independent of who the Chief Engineer happened to be at any time, whereas some railway engineers are permitted to take private pupils for whom the particular railway company would not be responsible if any question arose regarding them, and who may have to leave if the Chief Engineer leaves. It is not always that this is carried out, but it is a fact that must be borne in mind.

The premiums vary from as low as £25 or £50 to as much as £150 or £200 according to the size and importance of the railway, &c.

As to age limit, this ranges from 16 years on some lines to 18 years on others, but taken all-round the rule on this point is not rigid.

In regard to preliminary training, the London Matriculation degree although not absolutely essential, is of immense advantage and something equivalent is, of course, necessary, *i.e.*, some similar degree or certificate of training at some other Engineering Technical College. Years ago pupils were taken in and got on tolerably well if they had ambition and grit for self training, but this is not possible or acceptable to-day, as the conditions and experience necessary are so much more onerous that mathematical training of no mean order is imperative. For instance, a pupil commencing in an engineering office of any note at all, should be properly conversant with elementary trigonometry (and prepared to advance in it) also with algebra up to at least a thorough knowledge of quadratics, general mathematical knowledge (mensuration, &c.) also a fair acquaintance at least with the theory of structures, stresses in materials, &c., and a knowledge of ordinary land surveying and mechanical drawing. This is the very least that is expected.

In addition to the foregoing a certain amount of fitting-shop experience, &c., *i.e.*, mechanical training, is essential either in an engineering college or by serving a portion of the time in the railway shops.

It is difficult, perhaps, to explain clearly all requirements, in a brief paragraph, as so much depends on the circumstances, the district concerned, and particularly on the individual himself, but we are assured that a still greater difficulty is often encountered by railway engineers, and that is to make clear to parents and guardians why so much theoretical knowledge is necessary to-day, before any boy can hope to make a success of civil engineering.

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come of the war, but the necessity of keeping the movement going is as great as ever and under the fostering care and encouragement of the Company there is no doubt this will be done. When the Germans started their infamous submarine campaign the London and North Western Railway Company were not slow to realise that a considerable impetus could be given to the desirable and national movement of raising food on allotments by affording a ready access to the vacant land adjoining their property and every facility was afforded both to their own servants and the outside public to develop any unused plots. Spaces were pegged out and let to applicants at a nominal yearly rental of about 1s. with the result that more than 14,000 garden plots have been let and placed under cultivation. This is a striking record, but is quite in accordance with the usual public-spirited conduct of London and North Western Railway affairs. Many of the allotment holders—perhaps most of them—have not in the past been prominent in the tilling of the soil and for their benefit the London and North Western Railway has recently issued an excellent small guide. The booklet deals with just the kind of information an amateur gardener requires respecting soils, seasons, seeds, and all that appertains to raising crops of excellent British vegetables. It is a well-arranged booklet and well worthy of the great company from which it emanates.

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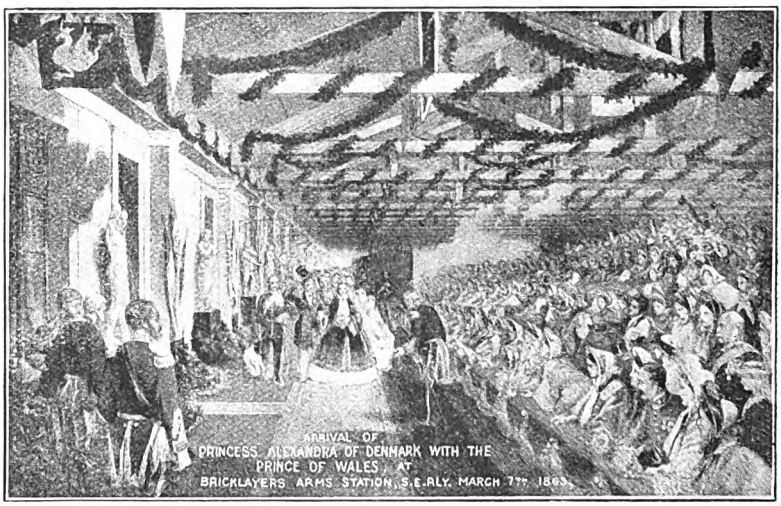
On the occasion of their recent visit to Edinburgh, the King and Queen, accompanied by the Prince of Wales, travelled north from Euston to Barnton, on the Caledonian Railway, where the Royal train was stationed for two days. On the day their Majesties spent driving through the capital amongst their Scottish subjects, from whom they received a warm welcome, the Royal train (London and North Western stock) arrived at Princes Street station shortly after 10 a.m., drawn by Caledonian engine No. 924, with No. 933 as pilot engine, both of the 4-4-0 type. After the Royal party left the station the public were permitted to enter the platform enclosure to view the handsome train, which consisted of twelve vehicles, and the privilege was greatly appreciated and taken advantage of by many. The Royal party left Princes Street Station at 4 p.m. and returned to Barnton, proceeding thence south to Euston overnight. During the time the Royal train was stationed at Barnton the branch service to and from Edinburgh was withdrawn, but the Caledonian Railway provided a service of motor buses between Craigleith and Barnton for the benefit of season-ticket holders desirous of travelling from and to the city.



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When Queen Alexandra first landed in England as the prospective bride of his late Majesty, King Edward VII, she alighted, as the accompanying illustration shows, at Bricklayers' Arms, which was at that time the West End Terminus of the South-Eastern Railway. It will interest many Railway Magazine readers to know that when his son, our present King, together with her Majesty the Queen and Princess Mary, drove through South London during the recent Armistice Celebrations, they were graciously pleased to stop their carriage outside that depot, when the opportunity was taken

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by the lady clerks to give expression to their loyalty and on their behalf Miss E. Simmons and Miss J. O'Morgan presented bouquets of flowers to her Majesty and the Princess. An acknowledgment has since been received from Buckingham Palace, as under—"The Lady in Waiting presents her compliments to the Head Clerk of the Female Clerks at Bricklayers' Arms Station, South-Eastern and Chatham Railway, and is commanded by the Queen to ask her kindly to express to all the Clerks Her Majesty's grateful thanks for the flowers they so kindly gave her, and to tell her how much the Queen appreciated their kind thought, and what pleasure it gave her to see them all."

FURTHER news of recent Crewe "doings" reaches us from Mr. C. Williams, to the effect that new 0-8-0 superheater engines put into service on the London and North Western Railway are Nos. 757, 829, 894, 1107, 1435, 1495, 1785, 2054, 2160 and 2236. A further engine of the same class is to receive the number 1261, which is that of one of the noted 18-in. cylinder 0-6-0 goods engines now scrapped. No. 1298 of the latter class has been fitted with slide-valves, as also No. 1626, of the 18-in. 0-6-2 tank type. To the list of converted compounds must be added No. 1937, *Superb* ("Jubilee" class), now 4-4-0 simple, and mineral engine No. 1094, now simple 0-8-0 superheater. An interesting item of information is that Lancashire and Yorkshire 4-cylinder 4-6-0 No. 1523 recently worked into Crewe on a special through troop train—a service generally performed by Lancashire and Yorkshire 0-6-0 engines. From another source—Mr. G. S. Harker, of Stoke-on-Trent—comes information to the effect that the "Claughtons" are now beginning to make their appearance in the Potteries, Nos. 162, 186, 1019 and 1085 having all been seen taking the 1.24 p.m. express from Stoke to Euston, due in London at 4.45 p.m. The engine concerned usually works into Stoke on the 12.15 p.m. *ex*-Crewe—a diminutive train whose load is on most occasions one of 7 axles!—and is at other times a 2-cylinder 4-4-0 or 4-6-0. From Manchester the London train, which leaves at 12.5 p.m., is worked as far as Stoke by one of the North Staffordshire Company's engines, generally one of Mr. Hookham's fine 0-6-4 superheater tanks.

IN connection with the reply given in the "Why and Wherefore" columns recently concerning solid bogie wheels for locomotives, we are reminded by several readers of types other than those mentioned which have been so equipped. Mr. L. B. Hewitt cites the first locomotives built by the late Mr. W. Adams for the London and South Western Railway in 1878—a series of twelve 4-4-0 tank engines, afterwards converted to the 4-4-2 wheel arrangement. He adds that twelve mixed traffic 4-4-0 tender engines, built in 1879, were similarly equipped. Lieutenant W. A. C. McConnell instances the engine concerned in the Tay Bridge disaster on the North British Railway as having solid wheels to the bogie, and on further reference we find that all the Wheatley's 4-4-0's on the North British Railway of the 224 and 264 classes were so fitted. Similarly the small North British Railway 4-4-0 tank engines and the corresponding engines of the 1171 class on the Caledonian Railway, possess these solid wheels.

CONCERNING London and North Western Railway Locomotives Mr. S. T. T. Geary communicates as follows:—Of the batch of 10 new superheated goods, the following are out and stationed as follows: 172, 31 (Abergavenny); 1306, 31; 1487, not yet allocated; 1793, 31; 2287, 31; 1261, not yet allocated. The remaining 4 are not yet numbered. In addition to these Nos. 1785, 2054, of the last batch are also at Abergavenny, whilst 1883, 1094, both converted from 4-cylinder compounds, have also been sent to the same destination. This is the first occasion superheater goods have gone to South Wales in bulk, although the following are already there 170, 631, 1329, 1885, 2034. For the first time during the last 2 years, cut-ups' have to be chronicled. These consist of 3050, 3407, 3513 D.X. type; 1261, 18 in. goods. This latter marks a new epoch in the history of London and North Western Railway scraps, being the first 18 in. Goods to go to the wall. For 3 years continuously this engine worked the 8.30 p.m. goods ex-Nottingham-Liverpool via Castle Donnington (Midland Railway) Uttoxeter (North Staffordhire Railway) Stoke and Crewe, working on alternate nights with a North Staffordshire Railway locomotive. On the duplicate list we now have 433-3600; 1742-3601; both special tanks. On the occasion of H.M. the King's recent visit to Edinburgh, the locomotives requisitioned were, 2663, *George the Fifth*; 1380, *Queen Mary*. It will be noted that *Fire Queen* had its name changed for the occasion. A similar occurrence can be recorded, when some two years ago 964, *Bret Harte* had its name changed to *Sir John French*, whilst taking the General to a military review.

TAKING as his subject "The Individuality of British Railways," Mr. M. D. Greville presented at the December general meeting

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of the Railway Club, 92, Victoria Street, S.W.1, a very remarkable paper, and his reading was rarely relished by a good attendance of members. Mr. W. Parker presided, and the proceedings included the election of three new members. On Saturday, December 7th, a Club visit was paid to the Kearney High Speed Railway Works, Battersea. Over 30 members and friends participated in the function, which was of a highly interesting character. Mr. Chalmers Kearney for upwards of an hour succinctly and satisfactorily answered the many questions raised, and at the conclusion a hearty vote of thanks was accorded to him. At the forthcoming meeting, on Tuesday evening, January 7th, Mr. B. M. Bazley, better known to RAILWAY MAGAZINE readers by his pen-name "Basil Mercer," is to address the Club, his subject being "Labour and British Railways."

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A RAILWAY MAGAZINE reader, who adopts the pen-name of "Strada Ferrate" writes:—In an old number of the *Illustrated London News*, I believe about somewhere in the 50's, is a cut which states below "Opening of the Railway from Kingstown to Jamaica." This gives some old-style trucks in the foreground with some small negroes in, and the background contains a carriage shed with several 4-wheeled carriages. Could some of your correspondents oblige me by informing me what type of engine was used for the opening and also what types were used after, up to 1880. I should also be obliged if a RAILWAY MAGAZINE reader could give me a list of types of locomotives used on the Demerara Railway which was opened in 1847 and finally completed from Georgetown to Mahaica in 1864. The types used I should like to know from 1847 to date. Another line opened from Vreed-en-Hoop to Greenquick Park this is on the 3 ft. 6 in. gauge. Could anyone inform me what type of locomotives are used? This line is in British Guiana. Yet another line in British Guiana is one running from Wismar on the left bank of the Demerara River connected with Rockstone on the right bank of the Essiquibo. Gauge is 1 metre and the line is worked by a firm of steamer proprietors. Particulars of types of locomotives used would oblige.

▣ ▣ ▣

THE Chairman of the Railway Nationalisation Society, Mr. Emil Davies, states that in a Bill which the Society had prepared provision is made for the acquisition of all railway stocks and shares at their mean market price during the 12 months which ended six months prior to the introduction of the Bill, the purchase price to be paid in 5 per cent. Government stock in such fashion that the holder of railway stock would receive as much of the Government stock as he could have bought had he been paid out in cash. Thus, the holder of £100 Great Western ordinary stock would receive £91 7s. of Government 5 per cent. stock, which would represent a market value equivalent to that which his railway stock possessed prior to Mr. Churchill's recent announcement of nationalisation. This would cost the State only £4 1s. 4d. interest per annum, as compared with £5 15s. which the holder of Great Western ordinary received as dividend. Speaking at the Dundee Chamber of Commerce Mr. Winston Churchill said railways in private hands must be used for immediate direct profit, but it might pay the State to run railways at a loss to develop industries and agriculture. He did not think the vital matter of nationalising railways would be delayed until the Royal Commission had wandered over the country making inquiries.

▣ ▣ ▣

AFTER perusal of his December, 1918, RAILWAY MAGAZINE, Lieutenant J. Crosfield writes from France as follows:—

On page 377 the photograph of a Mawddwy Railway carriage reminds one forcibly of the average French third-class coach seen on our troop trains. There is generally one to each train, also sometimes a first, the remainder of the train being composed of the usual cattle trucks. The French third-class coaches do not possess the four small windows; but only the window in the door. Not long ago I travelled in a compartment, the door of which would not keep shut. The lock had broken, and it was necessary to lean out from time to time and pull the door to again. Each jolt over the not too well laid line made the old coach squeak and jar so much that one expected it would fall to pieces. As you know, the Royal Ordnance Department locomotive stock is varied. On one day I saw the following engines, all of course now painted black, with Royal Ordnance Department numbers. Several of the standard 2-8-0 Great Central Railway type, a London and North Western Railway 0-6-0 goods, a Great Eastern Railway 0-6-0, a Great Northern Railway ditto, a Stroudley 0-4-2 from the London Brighton and South Coast Railway, a London and South Western Railway 0-6-0, two or three American Baldwin 2-8-0's, two American 2-6-2 tanks, and an old Belgian 0-6-0 with square dome. All these different types, with the addition of numerous War Department English wagons, and wagons-lits and English hospital trains side by side, make railway travel here more interesting to any one who is able to recognise the different rollingstock than it generally proves to the ordinary layman.

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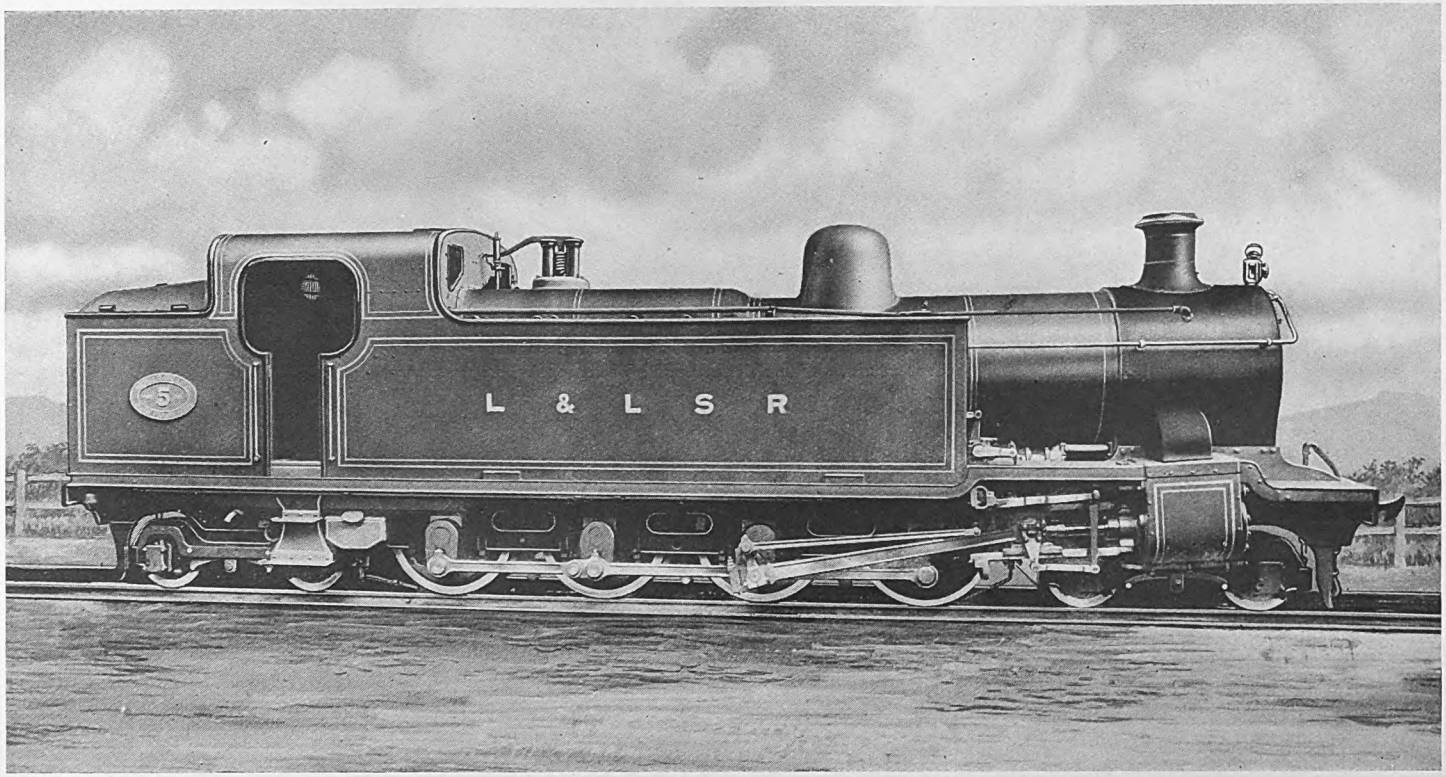

LONDONDERRY AND LOUGH SWILLY RAILWAY.

4–8–4 Narrow Gauge Tank Engine, No. 5.

Built by Hudswell, Clarke & Co., Ltd., Leeds.

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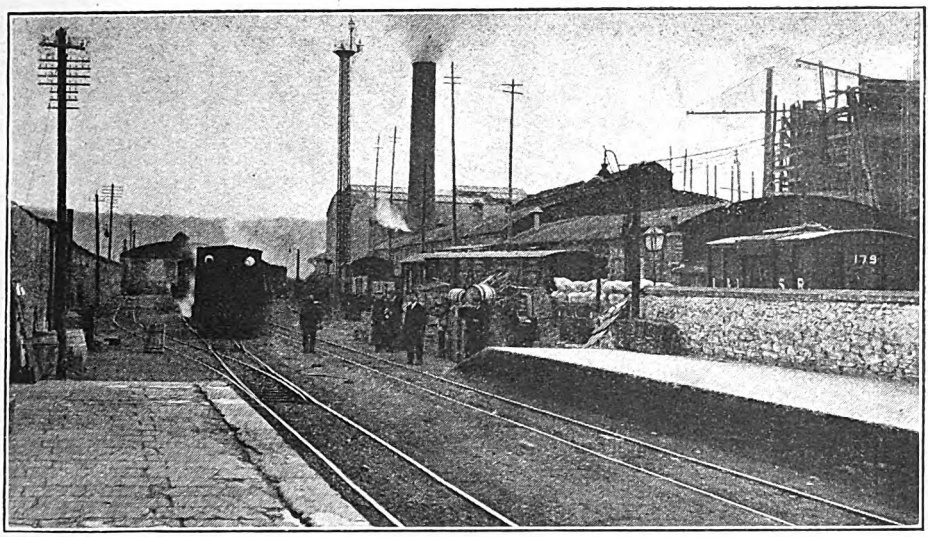

GOODS YARD AT LONDONDERRY.

Londonderry and Lough Swilly Railway.

OF the scores of romances that have been or might be written regarding the development of railways in different parts of the United Kingdom I venture to doubt whether many would be more interesting than the story of the rise, growth, fall, and eventual rise again of the Londonderry and Lough Swilly Railway. I cannot hope to present more than the barest outline of the story in an article of the length most suitable for the pages of the RAILWAY MAGAZINE. Enough to say that time was when the railway appeared to exist as little more than a joke. Every wag with a good railway anedcote fired it off at the expense of the Lough Swilly. If you ever heard of the driver who stopped his train on a steep up gradient every morning to get his half-pint of milk from a wayside peasant's cottage, he was certain to be a Lough Swilly driver. And the doggy guard, accustomed to carrying along a famous fighting terrier or game cock and stop the train at any point where a challenger could be found was of course a Lough Swilly guard. Similarly—but the heap of chestnuts flung at the reputation of the hapless line would fill a basket and I shall not be tempted into the unprofitable task of flinging any of them back. May I hint, however, that just as all is not gold that glitters, so even the most notorious little Irish railway has never been quite so black as it has sometimes been painted, and may the assertion be made that to-day the Lough Swilly, besides being one of the best dividend-paying lines in the Country—the funny thing is that, save in its very darkest days the line has been the envy of the shareholders of many a more pretentious concern—has come to be regarded with respect, and almost with the admiration always extended to one who having sown his wild oats, has settled down to middle age respectability.

So much by way of introduction to a sketch of the eventful if not absolutely unique career of a line occupying one of the outside corners of Ireland. The sketch appropriately follows the announcement that the railway's Parliamentary Bill of 1918 quite recently received the Royal Assent.

The map on page 74 shows that the Londonderry and Lough Swilly system, which, by the way, is the longest independent three-foot gauge line in the Kingdom, consists really of four distinct railways, to each of which separate circumstances, conditions, &c., attach.

The total mileage of the Londonderry

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and Lough Swilly system is roundly 100 miles, made up of :—

(1) The Londonderry and Lough Swilly Railway proper running from Londonderry to Buncrana (with a short branch line in the direction of Letterkenny), 14½ miles.

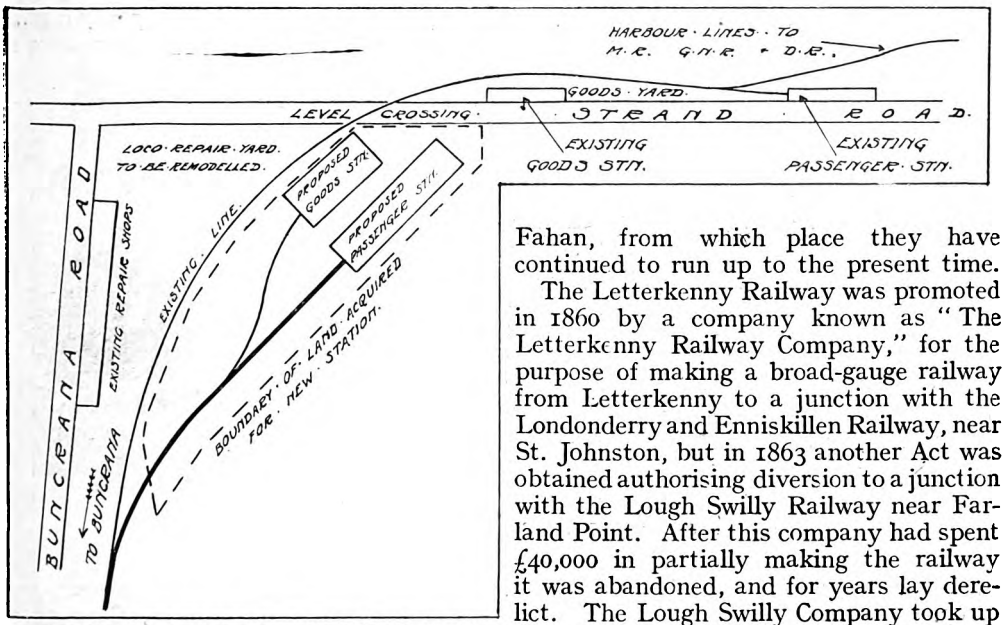
(2) The Letterkenny Railway running from the junction with the Londonderry and Lough Swilly line proper, near Tooban Junction, to Letterkenny, 16½ miles.

(3) The Carndonagh Railway running from Buncrana to Carndonagh, 18¼ miles.

(4) The Burtonport Extension Railway running from Letterkenny to Burtonport, 49¾ miles.

The Company were authorised by the Londonderry and Lough Swilly Railway Acts of 1853 and 1859 to make a line from Londonderry to Farland Point, and by the Londonderry and Lough Swilly Railway Act of 1861 an extension from Tooban Junction to Buncrana was authorised. These were made and worked for many years as lines of the standard Irish gauge, namely, 5 ft. 3 ins. After the opening of the Letterkenny line which was constructed on a three-foot gauge the Lough Swilly gauge was brought into conformity so as to avoid the tedious and inconvenient transhipment at Tooban Junction and make through running possible.

Prior to the opening of the extension from Tooban Junction to Buncrana the terminus was at Farland Point on Lough Swilly, about one mile on the Letterkenny side of the junction, but soon after the opening of the Buncrana line this station was closed, the short branch abandoned, and a boat service, which had been established from Farland Point to Rathmullan, Ramelton and Portsalon,—points on the Fanad Peninsula — was transferred to Fahan, from which place they have continued to run up to the present time.



SITE OF PRESENT AND PROPOSED NEW PASSENGER AND GOODS STATIONS AT LONDONDERRY.

The Letterkenny Railway was promoted in 1860 by a company known as "The Letterkenny Railway Company," for the purpose of making a broad-gauge railway from Letterkenny to a junction with the Londonderry and Enniskillen Railway, near St. Johnston, but in 1863 another Act was obtained authorising diversion to a junction with the Lough Swilly Railway near Farland Point. After this company had spent £40,000 in partially making the railway it was abandoned, and for years lay derelict. The Lough Swilly Company took up the project and obtained an Act in 1876 authorising its completion as a narrow-gauge railway. Towards the completion the Commissioners of Public Works advanced £50,000 as a first mortgage, and a further sum of £35,000 was advanced by the Treasury. The principal and interest of the last-named sum was guaranteed by the ratepayers of County Donegal and the City of Londonderry.

The line was opened for traffic on 30th June, 1883, and arrangements for its working by the Lough Swilly Railway were made by an agreement which expired in August, 1887. This agreement was renewed by the Commissioners of Public Works, who, in consequence of large arrears of interest on the first mortgage took

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possession of the line in 1888, for a period of 30 years ending 1917, with modified conditions. A new working agreement has been come to for operation as from 1917.

The Carndonagh line was built by public funds, and under an agreement dated 11th March, 1897, and made between the Treasury, the Commissioners of Public Works in Ireland, and the Lough Swilly Company, the line which is worked by the last-named company was opened for traffic on July 1st, 1901.

The Burtonport Extension Railway was also built by public funds, and under an agreement dated January 6, 1898, made between the Treasury, the Commissioners of Public Works, and the company, the Lough Swilly Company also work this line which was opened for traffic on March 9, 1903.

As has already been stated the history of the Londonderry and Lough Swilly Company has been a chequered one almost from its commencement as a very small railway from Londonderry to Farland Point, with an authorised capital of £49,000.

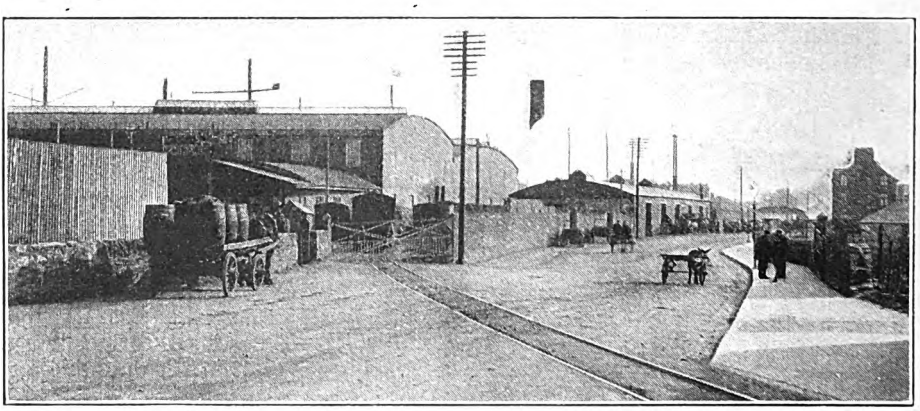
For many years the concern was practically bankrupt. It was only by the powers granted by the Londonderry and Lough Swilly Railway Act of 1882, which authorised the creation of preference stock for the purpose of paying off old debts, and by the loans which the Commissioners of Public Works granted from time to time that the company were ultimately able to pay their way and earn a dividend for the shareholders.

The company's capital at the present time consists of :—

	£
Debentures and loans ..	34,698
Preference stock	49,625
County Guaranteed Shares ..	10,000
Ordinary stock	50,330
Total	144,653

A reason why the amount of ordinary stock is at present very low is that under the arrangements made in 1882 many of the original holders of ordinary stock exchanged it for preference stock of one half its face value.

Although on its ordinary stock of £50,330 the company have for a number of years paid at the rate of 7 per cent., it should be stated that had they been required to pay interest on the money expended on the Burtonport, Carndonagh and Letterkenny lines, namely, £535,000, and also on capital expended on the Lough Swilly line proper, the earnings after meeting fixed charges and making provision for renewals and reserve, would not pay more than 1 per cent.



LEVEL CROSSING, PENNYBURN. (Londonderry).

Unfortunately, for many years after the opening of the Burtonport line in March, 1903, very many complaints were received by the Board of Works as to its inefficient working, and in 1916, acting under the powers given to them under the Railways (Ireland) Act, 1896, Section 7 (1), the Board of Works appointed Mr. Joseph Tatlow, the late manager, and now a director of the Midland Great Western Railway of Ireland, to inspect and report upon the condition of the undertaking and its

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working, maintenance and development. His report confirmed public opinion in the view that the Lough Swilly Company had failed in their obligation, and the Board of Works reported to the Lord Lieutenant accordingly.

The Lough Swilly Company were then required to appear before the Privy Council. The result was that the management of the Burtonport Extension Railway was taken from the Lough Swilly Company and their general manager was appointed Privy Council manager of the extension for a period of two years, as from July 1, 1917, under the supervision of Mr. Tatlow.

In addition the Lough Swilly Railway were required to put aside £10,000 to be applied by the manager of the Burtonport line in putting this line in order.

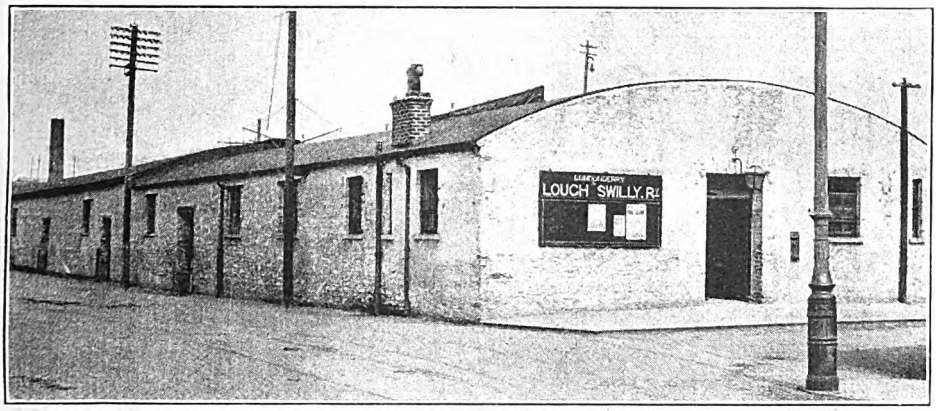
The proceedings in Dublin ending in these arrangements being made will long be remembered for the unpleasant exposure which took place of the Lough Swilly Company's default, a default, I hasten to explain, for which the present manager was not responsible.

Consequent on the revelations the Lough Swilly Company determined to put an end to the unsatisfactory condition of matters which had so long prevailed, and reconstructed their directorate.

The new board resolutely set before itself the task of improving the system and carrying out the various obligations imposed by Acts of Parliament and Agreements.

One of the difficulties under which the company laboured, and which came up in various ways, arose from the fact that they were under statutory obligations by their 1864 Act not to use engine power over the Strand road level crossing at Londonderry, and were also required by the same Act to erect bridges over their line at several crossings between Londonderry and Tooban Junction. (As a matter of fact the statutory obligations were never carried out, and engines regularly ran across the road.)

The new directorate undertook to bring forward a Bill to legalise their present position, and to seek authority to do certain things which they believe are in the public interest, as well as necessary for the development of the company. It is this measure which has now obtained the Royal Assent. Under the powers it confers the company intend to erect a new and convenient modern passenger and goods station at Londonderry, on the west side of the main road, as shown in the diagram on page 75. The present passenger and goods station situated on the east side of Strand Road will be closed.



LONDONDERRY STATION.—MAIN ENTRANCE.

Power to cross the road with steam engines when the new station is opened has been conferred, and the company has been freed from the obligation to bridge the level crossings referred to between Derry and Buncrana.

The point of exchange between the Lough Swilly Railway and the harbour lines is close to the present passenger station. The accommodation here is very limited, and with the view of improving the

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transferring of traffic from Lough Swilly narrow gauge to N.C.C. or G.N. (I) broad-gauge wagons and *vice versa*, it is intended to lay down a third line of rail from the Harbour Junction into the new goods yard, where better facilities for transhipping will exist.

For some years passenger trains of the Lough Swilly Railway Company were worked over the harbour tramway lines to a point near the centre of the city. The arrangement was convenient for passengers but friction arose, and with the growing trade of the Port of Londonderry it was inevitable that this working could not continue for long, and ultimately the trains ceased to run beyond the present terminus.

The level crossing over the road is used at present to the extent of between thirty and forty times a day, but under the new arrangements this will be reduced to about six times a day.

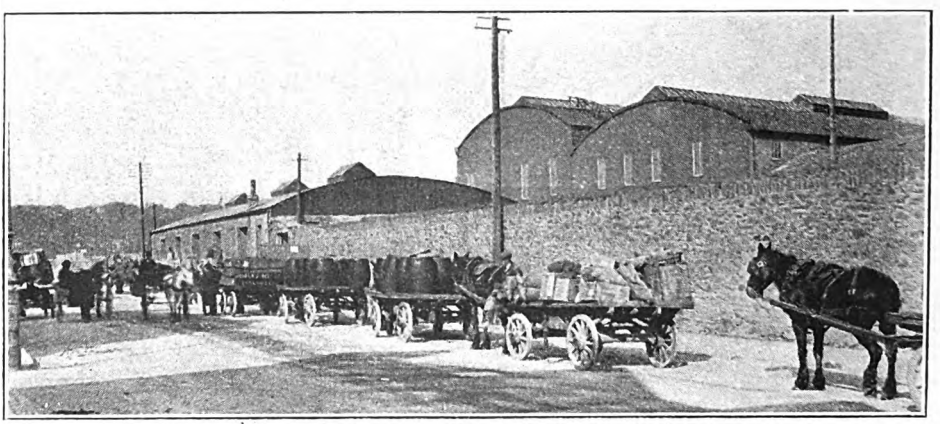
The necessity for new station premises at Londonderry is urgent. The facilities now existing are those which have existed from the first small beginning of the railway, and are totally inadequate as regards accommodation; the present passenger station is insanitary, a disgrace both to the railway and the City of Londonderry, and the cause of much of the criticism cast at the company by people who failed to realise the impossibility of enlarging and improving the accommodation on the present site.

In justice to the former board it has to be borne in mind that the premises were built at a time when the company's traffic was less than £5,000 a year, whereas, apart from naval and military traffic, the railway now conveys per annum approximately :—

Passengers	600,000 tons.
Merchandise	70,000 tons.
Coals and minerals ..	20,000 ,,
Live stock	30,000

The traffic has shown a steady and consistent increase for many years. As this increase is likely to be maintained the directors recognised the urgent need of better station accommodation.

The company own land at Pennyburn, adjoining the additional land acquired by the Act for the building of the new passenger and goods station, and this enables them to fully utilise the land they now possess. The result will be economy, a simplification of working, more convenient despatch of goods into Donegal, and the prospect of the still further development of the lines built by Government funds.



LONDONDERRY RAILWAY GOODS SHED EXTERIOR.

So inadequate is the accommodation at the present goods station that carts and lorries with goods for transit are delayed for hours before they can be unloaded and traffic over the County road is obstructed accordingly. The photographs serve to indicate how under existing conditions serious delay must arise.

The proposed site is not inconvenient. All other things being equal it would have been desirable to take the station nearer to the City. This, however, would be

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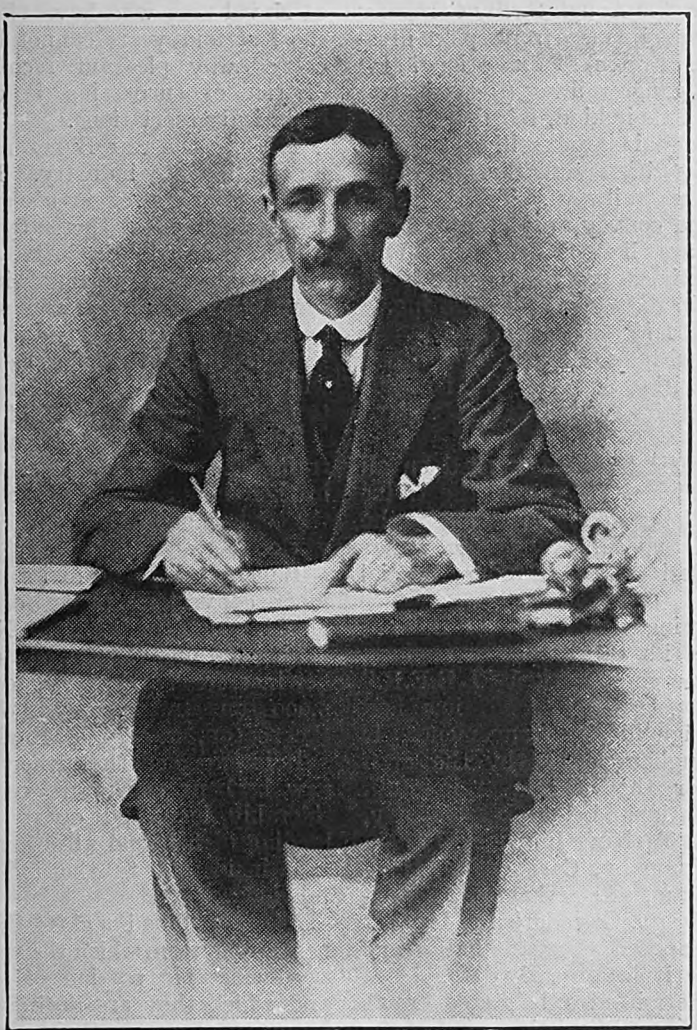

MR. J. BRICE MULLIN, D.L.,

Chairman,

Londonderry and Lough Swilly Railway.

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altogether too costly and require capital expenditure upon which the company could never hope to pay a dividend. Apart from this it would not be possible to have the goods station away from the level crossing over which all traffic to and from the Harbour lines must pass, without incurring unremunerative haulage.

Except that the Lough Swilly Company possesses two engines (see frontispiece illustration of one of them) of exceptional size for a narrow gauge railway (the only two locomotives of their kind, I believe, in the Kingdom) the engines and rolling stock are not materially different to those of other three-foot gauge railways. The carriages are roomy and convey an idea of greater size; they are lighted with acetylene gas, but as times become normal it is intended to introduce electric lighting.

The line is laid throughout, with few exceptions, with 50 lb. flat-bottomed rails of the British Standard Section, but a 60 lb. rail is being adopted as the standard for renewals.

The automatic brake is worked on all passenger vehicles. As a rule the trains are "mixed" but recently, owing to the heavy Naval and Military traffic, it has been found desirable to introduce special goods trains.

It is interesting to note that the Burtonport line has its own separate engines, carriages and wagons, marked L.B.E.R."

The railway, which at one time had not even signalling arrangements, is worked throughout either by the staff and ticket or the electric train staff, the staff stations being Londonderry, Bridge End, Tooban Junction, Fahan, Buncrana, Clonmany, Carndonagh, Newtowncunningham, Letterkenny, Kilmacrenan, Creeslough, Gweedore and Burtonport. It is proposed to make Falcarragh into a staff station at an early date.

As is now permitted to be stated Lough Swilly has during the whole period of the war been a naval base, controlling important trade routes along the North-West Coast of Ireland, and the Naval Forces, with headquarters at Buncrana and Rathmullan, have been very considerable. This and the large military camps at Luddan (near Buncrana) and Clonmany, together with smaller camps, depots and wireless stations at other parts of the line, have resulted in large numbers of naval and military men, and vast quantities of materials, stores, &c., being conveyed over the Lough Swilly Railway. Thus, it is not too much to claim that the line has played no mean part in the great war.

Buncrana during the whole period of the world's struggle has been a scene of great activity, and the many thousands of Naval men who have visited it during the last four years cannot have failed to carry away pleasant recollections of a district of surpassing beauty and rich historical associations.

Prior to the war Buncrana was famous for its herring industry. Large quantities of the "poor man's salmon" were regularly landed there by Scotch and other trawlers. Extensive additions to the harbour for dealing with this traffic have been sanctioned and will be carried out at an early date, and it is anticipated that the quantities of herrings landed will then be such as to enable Buncrana to rank as the Yarmouth of Ireland.

To meet this anticipated increased traffic the company have taken powers in their new act to make a railway from the existing line to the new harbour works.

Buncrana is proud of its position as the most convenient place for the landing of fish caught in the great North Atlantic fishing grounds, and in normal times herrings, fresh and cured, to the extent of 5,000 tons are sent from this station in the season, mostly to England.

It is expected that when the proposed new harbour works are completed, considerably increased quay space for the landing of fish and all other accommodation incidental to the industry will be provided.

As can well be imagined the fishing business is one from which the company derive a considerable portion of their revenue, and which they are desirous of fostering by every means in their power.

At the present time the catches have to be carted along the road from the pier to the station, an undesirable arrangement causing delay. When the fish is meant to go away in a fresh state it is advantageous that it should be loaded practically direct from the trawlers to the railway wagons on the quayside, and this will eventually be possible.

But the catches landed at Buncrana are

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not the only ones with which the company have to deal; the herring industry of West Donegal, particularly in the districts of Burtonport, Kincasslagh and Downings, is also of great importance. From these points large catches are regularly sent to the English markets and to the Continent, where Donegal-cured herrings are greatly prized. In the general scheme for improvement of harbours in Ireland Burtonport Harbour will probably be extended with improved accommodation at an early date, and when this is done the present catch of fish—about 15,000 tons per annum—will be greatly increased.

The line possesses little of outstanding interest from an engineering point of view. The Burtonport and Carndonagh lines pass through wild mountainous country, and through boglands. Owencarrow Viaduct, 1,140 ft. long and 50 ft. high on the Burtonport line, is perhaps worthy of mention, as also are the viaducts at Barnes Gap, near Creeslough and Faymore, near Dunfanaghy Road. The line has plenty of curves and steep gradients; some of the lines reach an altitude of 900 ft. above sea level.

The population served by the Londonderry and Lough Swilly Railway system is far greater than would ordinarily be thought. Donegal and Inishowen are not sparsely populated in the same way as some parts of Ireland. Indeed, the Burtonport line provides the only means of reaching several of the congested areas and it is frequently a great surprise to the uninitiated to find the density of the population of North-West Donegal.

Present directors of the company are: J. Brice Mullin, Esq., D.L. (*chairman*); I. J. Trew Colquhoun, Esq., J.P.

Mr. I. J. TREW COLQUHOUN, J.P.
Deputy-Chairman,
Londonderry & Lough Swilly Railway.

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(*deputy chairman*); Major H. J. McCorkell, D.L.; John Brewster, Esq., J.P.; John R. Hastings, Esq., D.L.; J. Kelso Reid, Esq., LL.D.

Bright with promise is the future of the railway. The country which it serves is commercially progressive and prosperous, and the industrial development of Donegal during recent years only emphasises the fact that with proper and efficient management the railway compares most favourably with other lines serving similar districts.

MR. H. HUNT,

Secretary and General Manager, L. & L.S.Rly., and Manager under Privy Council Order, dated 4th July, 1917, of the Letterkenny to Burtonpoint Extension Railway.

The transformation from chaos to order, from inefficiency to efficiency, from scorn to popularity, has been brought about by the broad-minded policy of the present Board during the last two years. Coming a little over that period to Londonderry, never had a manager a more difficult task to tackle than that undertaken by Mr. Hunt. The line had almost reached the bottom rung. The relations with the Board of Works and other public bodies were about as deplorable as they could well be; the very name of the railway was derided. In short the line had practically broken down and become a theme for the ridicule of comic poets. With this and a discontented staff—the milesmen, for instance, had been out on strike for four months—it might well have daunted any man. Mr. Hunt, however, had a stout heart, and already much has been done to rehabilitate the good name of the railway and re-establish it in public favour, and the pantomime singer has to find his jests elsewhere.

During that period, to sum up,—

The board has been reconstructed.

The differences with the Board of Works have been smoothed away.

A fresh agreement has been made for the working of the Letterkenny line.

The company's own manager has been appointed Privy Council Manager of the

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Burtonport line, and the company have, therefore, indirectly an interest in the working of the Burtonport line.

A Parliamentary Act has been obtained for the building of new station premises at Derry, for the abolishing of certain statutory obligations which threatened to strangle the railway, and amongst other things for the owning and running of steamers on Lough Swilly.

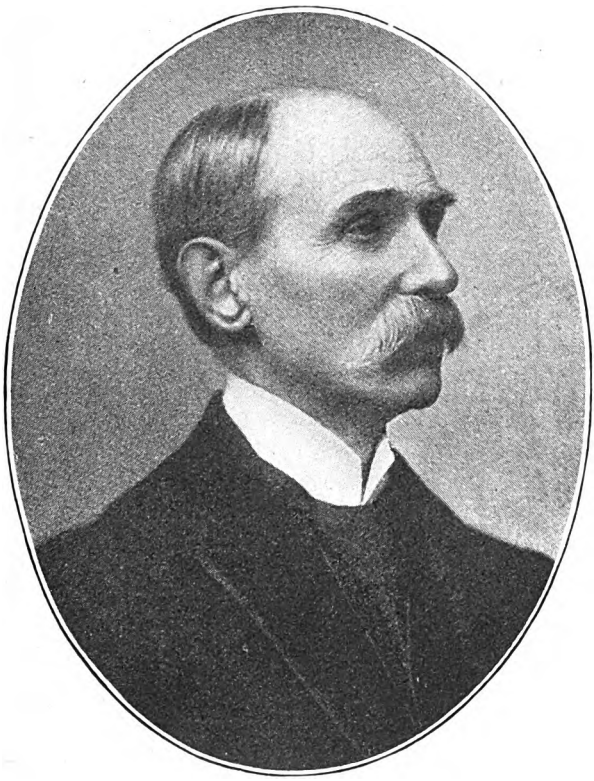
The stations, engines, carriages, &c., have been materially improved and repaired so far as war conditions have permitted.

The staff has been strengthened, and is loyal and content.

The trains keep better times, and

The resources of the country are being developed, and even the travelling public —that omnipresent critic of railway companies—acknowledge the progress that has been made.

Mr. Hunt will not talk about himself and generally evades all attempts to interview him. He, however, frequently refers to his old company, the Great Central of England where, he says, they worked more than talked. He has a lot of uphill work yet to do, but with the unstinted support of the Board of Directors, possessing, as he does, the unqualified loyalty of the staff, who are enthusiastic to a man in their desire to follow his lead, and enjoying the generous confidence of the public of all parties, he will undoubtedly, as the Americans say, "get there."



Photo] *[Lafayette, Ltd.*

SIR JOHN McFARLAND, Bart.

Formerly Chairman of the Londonderry and Lough Swilly Railway.

No history of the Londonderry and Lough Swilly Railway would be complete which did not specially refer to Sir John McFarland, Bart., for a long series of years the Chairman, and for still more years a Director of the Company. It is only fair to Sir John to say that for years he bore the great burden of rescuing a derelict railway company and lifting it

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to a 7 per cent. paying concern. Although many found fault with Sir John—and some of the criticisms were neither kind nor just—it will at least be admitted by all that the raising of the financial status of the company was no mean achievement. As for the work involved in fixing up the original arrangements under which the Carndonagh and Burtonport lines became part of the Lough Swilly system, it must stand as a lasting memorial of his indomitable will and business tenacity. At any rate Sir John McFarland's name will always be remembered whenever the Londonderry and Lough Swilly Company is spoken of.

This article is not meant to be a tourist guide and one hesitates to say anything about the holiday features of the line, but perhaps it is permissible to point out that traversing North-West Donegal as it does, it is the direct route to the whole of the northern portion of the far-famed Donegal Highlands, including the picturesque districts of The Rosses, Gweedore, Rosapenna, Glenveagh, The Lennon Valley, Portsalon, Lough Swilly and the extensive peninsula of Inishowen. The countryside included is very rich in old time associations, interesting alike to the patriot and the visitor. The antiquary, the geologist, the botanist, the naturalist, and the ethnological student will find it a wide field of instructive research. The artist can hardly fail to be charmed with the many and varied subjects for pencil, brush, or camera. To the sportsman it is a veritable El Dorado; much of the shooting and fishing is quite free, the remainder, with very few exceptions, being available at nominal cost. The angler, especially, will be delighted with the sport obtainable on the numerous loughs and rivers, including the rivers Clady, Lackagh, and Lennon, and over 500 loughs. The sea-angling is second to none in the British Isles, and the wild-fowling and shore-shooting would be hard to beat anywhere. Golfing enthusiasts are also exceptionally well catered for; the courses available include the famous links at Portsalon, Rosapenna and Lisfannon, together with other good sporting links at Rathmullan, Dunfanaghy and Greencastle. There is sea-bathing galore associated with perfect strands and safe conditions, and yachting and boating facilities are almost inexhaustible. For the most part the roads are good for cycling, and, to sum up, there are few countrysides so highly favoured by nature for holiday-making purposes. Beyond all the air is wonderfully invigorating and the climate mild and equable.

LOCOMOTIVE AND TRAIN WORKING IN THE LATTER PART OF THE 19TH CENTURY.

Railways already dealt with in the "Railway Magazine" by Mr. E. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print except May.)
GREAT NORTHERN: June, July, 1915. (Both out of print.)
MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. out of print.)
GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Dec., Jan., Feb., June, July, and Aug. out of print.)
GLASGOW & S.W.: Sept., Oct., 1916. (Sept. out of print.)
NORTH EASTERN; Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov., Dec., 1916, Jan. and Feb., 1917, out of print.)
SOUTH EASTERN: June, July, Aug., 1917.
LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.
LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918.
CALEDONIAN: March, April, May, June, 1918.
GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)

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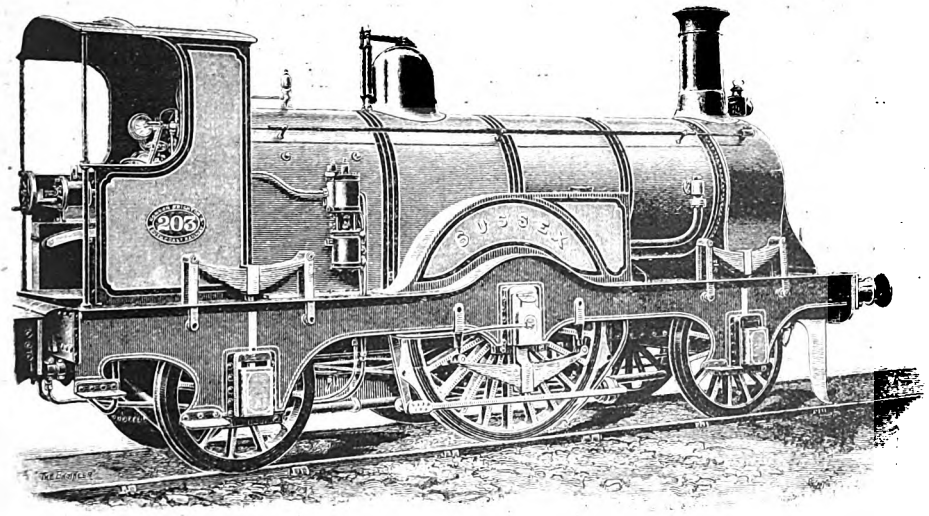
Locomotive and Train Working in the latter part of the 19th Century.

THE LONDON, BRIGHTON & SOUTH COAST RAILWAY. [No. II.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

OF the 6 ft. 6 in. singles with cylinders 16½ in. by 22 in. and 17 in. by 22 in. belonging to Brighton shed, which ran daily to London Bridge and Victoria, those which I remember chiefly were 194, *Glynde*, 195, *Portsmouth*, 196, *Pevensey*, 197, *Cavendish*, 198, *Drayton*, 199, *Paris*, and 200, *Dieppe*, many of which were built by Stephenson and Co., 1864, though 194 and 196 hailed from Brighton Works in 1866. Nos. 194 to 200 were subsequently renumbered 484 to 490 in 1887–8, and the name of 199 was altered from *Paris* to *Newport* in 1883. They were broken up between 1890 and 1893, except *Dieppe*, which worked at Tunbridge Wells until 1896.

The only Craven express engine of this type to be rebuilt as a "single" by Mr. Stroudley, No. 203, *Sussex*, was also stationed at Brighton, and used on the London expresses. After its rebuild in 1871 the cylinders were enlarged to 17 in. by 23 in. It was subsequently fitted in 1892 with a new fluid-pressure reversing gear designed by the late Mr. David Joy, and described by him in a paper read before the Institution of Mechanical Engineers in 1894. A single eccentric was used for each cylinder, and to reverse the engine this eccentric was moved transversely across the axle from front to back for forward or backward gear. For this purpose the axle was squared where the eccentric was mounted upon it, and an oblong slot through the eccentric allowed the latter to be slid across the axle. In each end of the slot there was a small cylinder, which worked over a corresponding ram fixed on opposite faces of the



No. 203, "SUSSEX,"

Built by Stephenson & Co., 1864. Rebuilt at Brighton, 1871, by Mr. Stroudley.
Driving wheels, 6 ft. 6 in. Cylinders, 17 in. by 23 in. This engine was subsequently fitted with Joy's Oil Valve Gear).—(From *The Engineer*.)

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square on the axle. Oil was forced into each end of the axle at the centre of the latter, and the illustration of 203 shows the inlet pipe. The small oil passages passed along one web of the inside crank, through the crank pin, and then back along the other web to the central portion of the axle, where it entered the small cylinders, either into one or the other, according as it was required to move the eccentric into either position for fore or back gear. The eccentric could be held between these extremes for any point of expansion or for mid gear. The oil was actuated from a small cylinder placed on the footplate, and fitted with a piston which could be moved by a hand wheel or by steam. The movement of the hand-wheel was assisted by a small air cylinder supplied with air from the Westinghouse brake reservoir. This gear was very ingenious, and its basic principle seems to have been derived from that of the old Dodds wedge motion, though the "hydraulic" use of oil and the method of carrying out the design were entirely new.

I should perhaps explain that this gear was fitted by Mr. Stroudley's successor Mr. R. B. Billington, and has been described here as a matter of interest in connection with the engine No. 203, *Sussex*, which remained at work until January, 1899.

As far as I know the *Sussex* was the only engine in the country to be fitted with Joy's fluid-pressure reversing gear.

There were two other single express engines of Mr. Craven's design, stabled at Brighton, of considerable interest, Nos. 164, *Spithead* and 165, *Southsea*. These were of the "Jenny Lind" type, *i.e.*, they had inside bearings only for the driving axle, but outside bearings for the leading and trailing axles. The driving wheels were 6 ft. 6 in. and the cylinders 16 in. by 20 in. They were originally built for the Portsmouth—London service, but seem to have migrated to Brighton after Mr. Stroudley's singles of the "Stephenson" class took up the Portsmouth work. They were always to be seen at one or other of the London termini on main line trains, and worked from 1862 to 1891 and 1890 respectively, when they were scrapped. From my recollection of them I should think they must have been almost the hardest-worked engines on the line, for they rarely seemed to be off duty. In their last years they worked between Brighton and Tunbridge Wells. Another similar but smaller engine, 161, *Havant*, with 16 in. by 20 in. cylinders and 6 ft. driving wheels, ran principally between Portsmouth and London, and was at one time often to be seen on the 4 p.m. express to Portsmouth from London Bridge, on which, considering its very small size, it did some very creditable work.

There were four other 6 ft. 6 in. single engines of the double-framed type, of which two with 17 in. by 22 in. cylinders were Nos. 146, *Lancing* and 147 *Worthing*. I used to see them on main-line expresses at London Bridge, though I am not certain as to the shed which they made their home, but I rather think they came from Hastings or Eastbourne. They were afterwards in 1880 renumbered 451 and 452, and disappeared in 1886. Two similar engines with 16½ in. by 22 in. cylinders, Nos. 172, *Chichester* and 173 (without name) hailed from Hastings, and were about the only old single express engines of those previously mentioned that I do not remember personally.

Generally speaking, during the first twelve years of Mr. Stroudley's superintendency by far the greater number of the express trains on the Brighton line were run by single engines, and even after Mr. Craven's express engines began to disappear and were replaced by Mr. Stroudley's "Gladstone" class of coupled engines, the single engine still held its own on many of the lighter Brighton expresses, and almost monopolised the Portsmouth road until the end of the century. In those days, therefore, the Brighton, like the Great Northern and Great Western, was a "single" engine line.

Of the older coupled engines used for the slower main-line and other trains there was considerable variety, but I do not intend to mention more than certain engines, which were always to be seen on main-line trains into and out of London. The other coupled engines of various sorts, shapes and sizes had drifted into the backwash of distant branch lines. Of what I may term the main line coupled engines, other than those built by Mr. Stroudley, there were about 30 double-framed 2–4–0 engines with 6 ft. wheels

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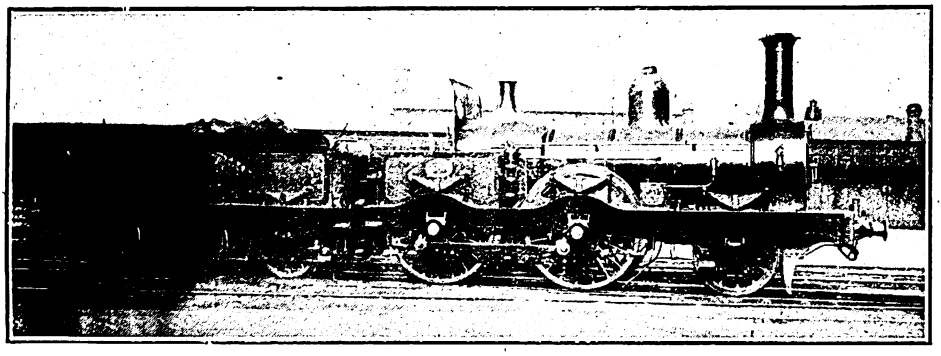
and 16 in. by 20 in. cylinders, of which twelve, Nos. 178 to 189, were built by Beyer, Peacock and Co., 1864, and six, Nos. 242, to 247, by Dübs and Co., 1867, the last lot being renumbered 457 to 462 in 1881. The others of the class, 149 to 152, 159, 160, 174 to 177, 371 and 377 were built at Brighton at various dates between 1862 and 1868. Nos. 149 and 150 were perhaps better known by their subsequent numbers 454 and 455. Most of the Brighton-built engines of the class were stationed at Brighton and Hastings, and the former shed also claimed the six engines by Dübs and Co., but the Beyer Peacock's were nearly all at New Cross and Battersea. Anybody who dropped in at either Victoria or London Bridge would almost always see two or three of the latter. They earliest recollections as a frequent visitor to London Bridge, whence it came, I believe, from Brighton on the stopping trains. A somewhat similar 5 ft. 6 in. engine, No. 258 (afterwards 506) *Rouen*, was stationed at New Cross, and seemed to be mostly employed on local trains in the London area.

The above brief notes do not exhaust the list of Craven single and coupled engines, but mention only the more prominent engines. There were a number of 6 ft. singles, such as 233, *Horsham* and 235, *Dorking*, and others without names, which, I think, in company with odd engines with 5 ft. 6 in. wheels, both singles and coupled, were principally employed on the coast lines, and, except engines 232 to 235, were not frequent visitors to London. Of the



Photo] [*Locomotive Publishing Co., Ltd.*

2-4-0 PASSENGER ENGINE (J. Craven),

Built by Dübs & Co., 1867. Wheels, 6 ft. Cylinders, 16 in. by 20 in.

began to disappear in the middle "eighties" and by the end of 1890 all had gone, as Mr. Stroudley never rebuilt any of them. No. 174 exploded at Lewes station in September, 1879, whilst working the 2.5 p.m. train from Hastings to London. I understand that Lewes has never known so much excitement.

Another visitor to London, which came from Littlehampton, was No. 40 (afterwards 260 and 464) *Epsom*, a pretty little engine, originally by Sharp, Stewart and Co., with 5 ft. 6 in. wheels and 16 in. by 20 in. cylinders, which was the only old Craven coupled engine which Mr. Stroudley deigned to glorify with a new boiler, and there was also another Brighton-built 5 ft. 6 in. coupled engine, No. 148 (afterwards 453) *Ryde*, which was one of my 6 ft. singles of the "Horsham" class, 232 to 235 (afterwards 485, 487, 474 and 475), were at Portsmouth, at one time working the London expresses, and one or two may have been at Tunbridge Wells.

Mr. Stroudley's first express engines of 1871 to 1875 consisted of half-a-dozen very handsome 2–4–0 engines with double frames, the only engines of this type that he ever constructed, for afterwards he adhered exclusively to the 0–4–2 design for both local passenger and express engines. Of the former there were 201, *Belgravia*, 202, *Goodwood*, 204. *Westminster*, and 205, *Kensington*, all of which came out from Brighton Works in 1872, the last two being partial rebuilds of Stephenson's single engines. Nos. 206, *Carisbrooke* and 207

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Freshwater were built at Brighton in 1875. The cylinders were 17 in. by 24 in., coupled wheels 6 ft. 6 in., and the heating surface of 204 and 205 was 1,224 sq. ft., towards which the firebox contributed 112 sq. ft., but in Nos. 201 and 202 the tube surface was increased,and the total heating surface reached 1,284 sq. ft. On the other hand, Nos. 206 and 207 had only 1,132 sq. ft. total heating surface. These engines, more especially 206 and 207, worked the 8.45 a.m. up express from Brighton to London Bridge, returning with the 5.0 p.m. down until 1880, when they were replaced by the newer 0–4–2 coupled engines of the "Richmond" class. All of them were stationed at Brighton for main line London work, and were for a long time the finest and most handsome express engines on the line. During the late "eighties" No. 205 and one or two others of the class were removed to St. Leonards to replace the old 174 class then broken up. They were scrapped between 1899 and 1901, and it seems a pity that such excellent engines were not rebuilt, for there were many trains on the line on which they could have continued to do very good service.

Mr. Stroudley's next coupled passenger engines were 0–4–2 engines, very much on the lines of Mr. P. Stirling's Great Northern "mixed traffics." They had 5 ft. 6 in. wheels with 17 in. by 24 in. cylinders, and were known as the D 2 or "Lyons" class. Of these No. 300 came out in 1876, 301 to 305 in 1877, 306 and 307 in 1878, being followed in 1883 by Nos. 309 to 313. Their names, taken in order of numbering, were *Lyons, Caen, Turin, Milan, Nice, Genoa, Naples, Venice, Como, Splugen, Laval, Rhone, Albion* and *Paris.*

According to the "History of the London, Brighton and South Coast Railway Locomotives," they were specially built for working the fast fruit traffic between Worthing and London, and fast fish and "Grand Vitesse" trains between Newhaven and London, and were also used on heavy excursion and stopping main-line passenger trains. At one period I can remember seeing them at work on some of the expresses, such as the old 2.10 p.m. from London Bridge to Hastings, which was frequently worked in the late "seventies" by No. 300, *Lyons.* The 8.0 p.m. "Grande Vitesse" train from London Bridge to Newhaven was at one time always worked by No. 313, *Paris.* Nos. 302, 303, 309, 311 and 313 belonged to New Cross, Nos. 304, 305, 306, 308, 310 and 312 to Battersea shed, the others being quartered at Brighton. Their day is now over, and all were scrapped between 1902 and 1907, though it is hard to say why such apparently good and useful engines had not a longer lease of life.

The single express engine, however, held its own on the "Brighton" during Mr. Stroudley's tenure of the locomotive chieftainship. His first design of this type was the celebrated *Grosvenor,* No. 151, built in 1874, subsequently in 1880 becoming No. 326. The *Grosvenor* had 6 ft. 9 in. single drivers, with 17 in. by 24 in. cylinders, and 1,210 sq. ft. of heating surface, of which the firebox had 110 sq. ft. It was stationed at Battersea, and put to work on the Portsmouth expresses, and in August, 1875, was the first engine to make the through run from Victoria to Portsmouth, 86¾ miles, which was stated to have been done in 110 minutes. The same engine was also reported to have run a through express from Victoria to Brighton, consisting of 22 10-ton coaches, in 70 minutes. Another single engine of very similar appearance to the *Grosvenor,* viz., *Abergavenny,* 325, came out in 1877. This had 6 ft. 6 in. driving wheels, but for some reason unknown to me the cylinders were only of the very small size of 16 in. by 22 in., the boiler having a total heating surface of 1,074 sq. ft. The engine was therefore of less power than Mr. Craven's 6 ft. 6 in. singles of 1861. The *Abergavenny* was the only engine of its class, and was quartered at New Cross. For some years it ran the night boat train to Newhaven; but in its later years found a home at Tunbridge Wells. Finally in 1880-1882, 24 more 6 ft. 6 in. singles of the same type (the G class) with inside frames throughout, but having 17 in. by 24 in. cylinders and 1,184 sq. ft. of heating surface, made their appearance, and were the last single engines possessed by the company. Orginally, like all Mr. Stroudley's engines hitherto described, they had 140 lb. boiler pressure, but this was afterwards increased to 150 lb. They were built for the Portsmouth traffic, and

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the following is the list of their names and stations :—

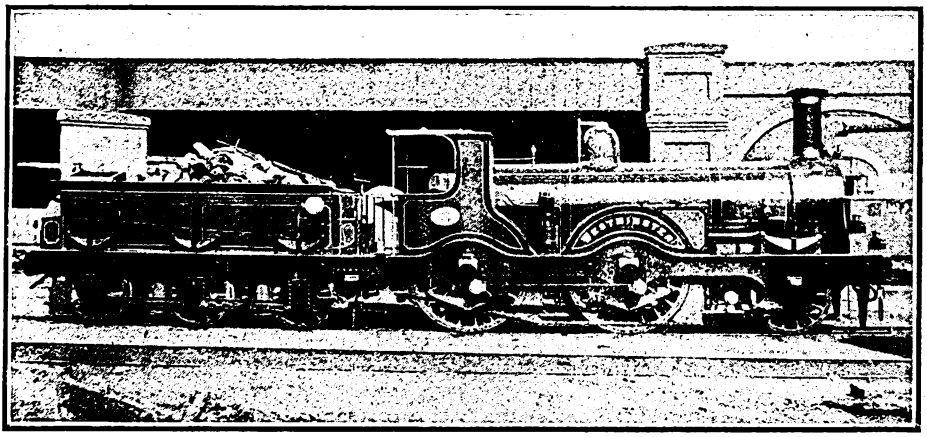
327	*Imberhorne*	B	339	*London*	P
328	*Sutherland*	Nx	340	*Medina*	,,
329	*Stephenson*	B	341	*Parkhurst*	,,
330	*Newhaven*	Nx	342	*St. Lawrence*	,,
331	*Fairlight*	,,	343	*Wilmington*	B
332	*Shanklin*	B	344	*Hurstmonceux*	P
333	*Ventnor*	Nx	345	*Plumpton*	,,
334	*Petworth*	B	346	*Alfriston*	Nx
335	*Connaught*	P	347	*Dallington*	,,
336	*Edinburgh*	,,	348	*Lullington*	,,
337	*Yarmouth*	,,	349	*Albany*	B
338	*Bembridge*	,,	350	*Southbourne*	Nx

B=Battersea, Nx=New Cross, P=Portsmouth.

The design of the tenders in these and all Mr. Stroudley's subsequent engines was peculiar in that the frames were altered so as to place the springs outside where broken plates could be seen and the springs got at when required.

The engine 329, *Stephenson* was specially named when new in 1881 when it was sent to the Stephenson Centenary at Newcastle, where it took part in the procession of engines to Wylam.

Nearly all the Portsmouth expresses from Victoria and London Bridge were worked for many years almost exclusively by these engines, which also ran some of the Eastbourne expresses until the "Richmond" class were stationed there in 1884. The G class singles lasted until 1907-1909, when they were nearly all broken up. The *Stephenson* was the



Photo] [*Locomotive Publishing Co., Ltd.*

No. 204, "WESTMINSTER,"

Rebuilt in 1872 by Mr. W. Stroudley from single engine by Stephenson, 1864.
Wheels, 6 ft. 6 in. Cylinders, 17 in. by 24 in.

inside, with the wheels outside them, and gave the engine the appearance of being "all legs." This arrangement was such that the wheels were interchangeable with the carrying wheels of the tank and express engines. Mr. Stroudley stated that there was therefore no necessity to allow the wheels to remain in the leading end of an engine after the tyres had worn below a certain thickness, "as they would run with safety in a tender, when it would not be judicious to use them under the engine." But there was the disadvantage of making the tender springs less accessible, and on most other lines such as the Midland and Great Northern, the tenders had been last survivor and lasted until 1912. The best performance of one of this class of which I have a record was from London Bridge to Chichester, 69½ miles in 86½ min., an average speed of 47.9 m.p.h.

The first of Mr, Stroudley's 0-4-2 express engines with leading coupled wheels of large diameter were the six engines of the "Richmond" class, built at Brighton in 1878 to 1880. These were the prototypes of the celebrated "Glasstone" class and very like them in external appearance. The cylinders of the "Richmonds" or D3 class were 17½ in. by 26 in., and the six engines were 208, *Richmond*, 209, *Devonshire*, 210, *Corn-*

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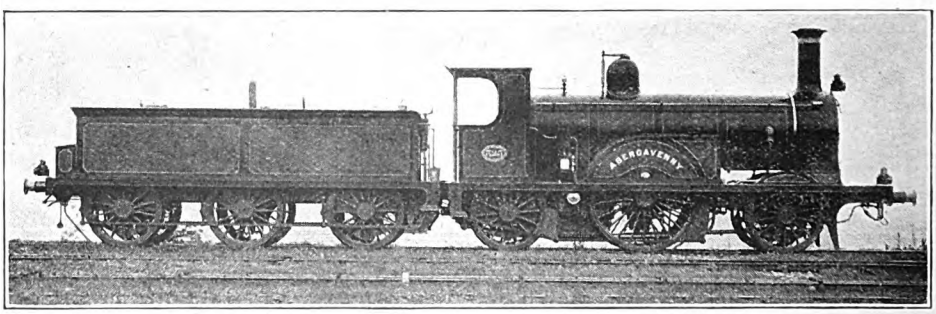
wall, 211, *Beaconsfield* (in 1883 renamed *Cavendish*), 212, *Hastington*, and 213, *Norfolk*.

They were put to work on the heavy Brighton—London expresses, including the 8.45 a.m. up and the 5.0 p.m. down, from which they displaced the *Carisbrooke* and *Freshwater*. They remained at Brighton until 1883-4, when in their turn they gave way to the "Gladstones," and Nos. 209 to 212 were transferred to Eastbourne shed, and amongst other trains worked the 8.30 a.m. business express up from that place to London Bridge, returning with the 5.5 p.m. down. These engines have been broken up within comparatively recent years.

There was also towards the end of the century a certain amount of triangular



2-2-2- Single Engine No. 325. "ABERGAVENNY."

Built at Brighton 1877 by Mr. Stroudley. Wheels, 6 ft. 6 in. Cylinders, 16 in. by 22 in. The "Stephenson" Class, Nos. 327 to 350 were very simi'ar but had cylinders 17 in. by 24 in.

engine working east of Brighton, *i.e.*, Hastings or Eastbourne to London, thence to Brighton, and back home along the coast line. This working was usually done by the St. Leonard's and Eastbourne engines, and occasionally by Brighton engines, but not by the London engines. The Brighton engines always worked to Eastbourne and Hastings. The Eastbourne express trains ran via Keymer Junction and Lewes, except the up night mail which ran via Brighton. There were, however, certain Eastbourne through carriages on Tunbridge Wells trains, which were taken off at Groombridge, and then went on to Eastbourne via Heathfield and Hailsham. During the "eighties" the South Eastern also ran certain through trains with their own engines to Eastbourne from Tunbridge Wells over the same road.

The Hastings engines of the old (Craven's) 174 class, 2-4-0, were afterwards replaced by the "Kensington" 205 class, Stroudley's 2-4-0 engines already described.

There were in addition one or two up and down stopping trains between Brighton and London, which ran via Shoreham and Horsham.

Most of the longer cross-country branches, such as those radiating from Horsham, and the East Sussex lines in the direction of Tunbridge Wells were worked by Mr. Stroudley's D class 0-4-2 side tank engines. A number of the short branches on the Sussex coast were worked by the miscellaneous tank engines left by Mr. Craven. The Ford Junction—Littlehampton branch was for many years in charge of an old single-driver tank engine No. 25, afterwards 268 and 399, with outside cylinders 13 in. by 18 in, and 5 ft. 6 in. driving wheels, which ran until 1884. This was later succeeded by a 0-4-2 saddle tank by Kitson and Company, the *Bognor*, then No. 358, (afterwards 496) with 12 in, by 18 in. cylinders and 4 ft. coupled wheels, which ran between Littlehampton and Arundel until about 1895. The Havant and South Hayling service was worked by a small Sharp Stewart 2-4-0 side tank, the *Hayling Island*, originally No. 96, and after 1883, No. 499. This had a tall dome over the firebox, 4 ft, driving wheels, and 10 in. by 16 in. cylinders.

(To be continued).

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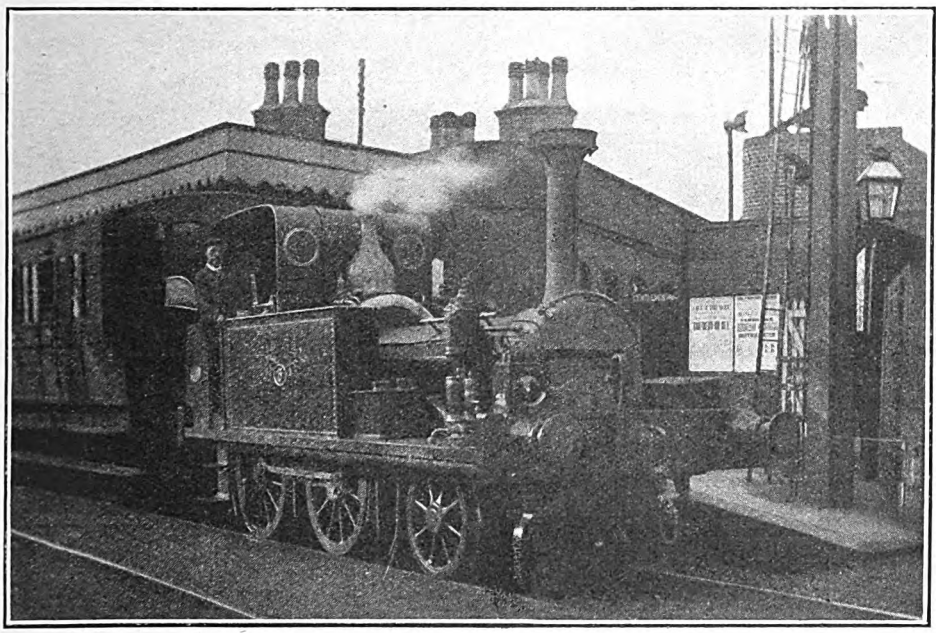
Off the Beaten (Railway) Track in London.

By H. L. HOPWOOD.

SUCH a title as we have chosen for this article may appear strange; nevertheless, it is a fact there are some branch lines in the London district, which, by reason of their location, a limited train service, or other circumstances, are quite off the beaten track of the regular traveller, and very little known, even to those who consider themselves tolerably well acquainted with the railway geography of the Metropolis.

The majority of these lines are situated in the area served by the Great Eastern Railway, and in planning a journey over them, Fenchurch Street station will be the most convenient starting point. If we take a ticket to Blackwall, we travel over the route of the London and Blackwall Railway, opened 1840–1, and, therefore, one of the oldest railways in London. At first this line ran only from the Minories to Blackwall, the extension Citywards to Fenchurch Street following 12 months later. The line was then of 5 ft. 0½ in. gauge and trains were worked by means of a cable. There were two tracks, used alternately for up and down trains, and each line had its separate cable, which was wound round drums at the engine houses at the Minories and Blackwall. As each rope was wound round one drum, it was unwound from the other. Between Fenchurch Street and the Minories there was a falling gradient of 1 in 150, which enabled the down trains to run by gravity, and those in the opposite direction by momentum acquired during the journey.

Trains ran every 15 minutes and a novel feature was that each station was



Photo] MILLWALL DOCKS COMPANY. [*H. L. Hopwood.*

2–4–0 Passenger Engine No. 6 (now Port of London Authority No. 31).

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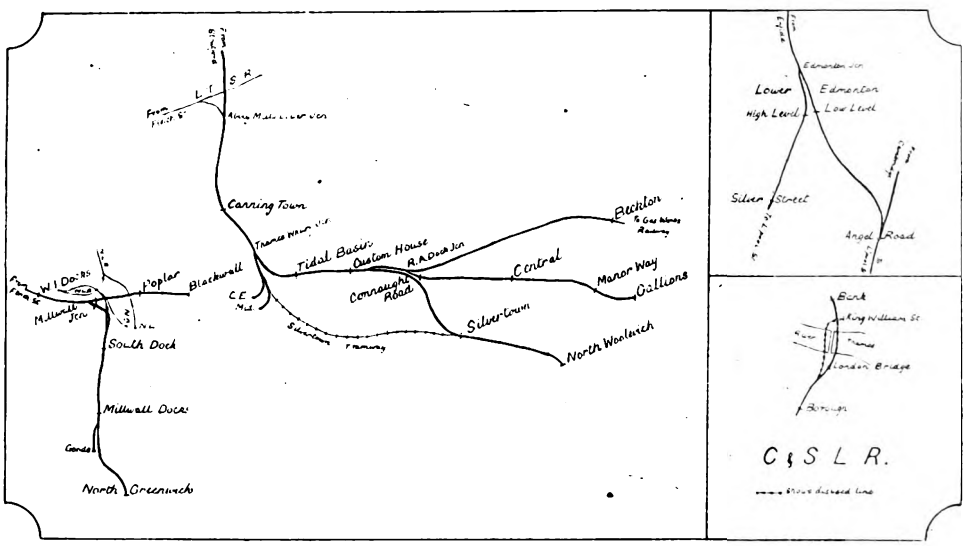
served by a non-stop coach. Briefly, the method of working was as follows :— A train of seven coaches left Fenchurch Street and on reaching the Minories was attached to the rope. The last (or seventh) coach was slipped at the first station after the Minories, the sixth at the second station, and so on ; only the two front coaches going through to Blackwall. In the meantime, single coaches were leaving each intermediate station for Blackwall at the same time as the train left Fenchurch Street, and as the coaches were necessarily travelling at the same speed as the rope, there was the same interval between each. Coaches that were slipped intermediately, remained at the stations until the rope was wound in the opposite direction, when they proceeded singly to Fenchurch Street in front of the main train from Blackwall, which, as it went on its way, was parting with its own coaches at intermediate stations, as on the down journey.

Breakdowns and consequent delays were frequent, and in April, 1849, locomotives displaced the winding engines and cable haulage. At the same time the gauge was narrowed to standard dimensions and the branch from Stepney to Bow was opened.

The Blackwall Railway, "which soon became the dirtiest in the South of England,"* was leased to the Great Eastern Railway in 1866, and among the plant taken over were 11 locomotives. To-day, the Blackwall line is worked by some of those curious Great Eastern 2-4-0 side tank engines, which are really 0-6-0's, with the leading half of the coupling rods removed. Trains run at about every half hour on weekdays only, the former Sunday service having been abolished some 10 years ago.

In 1840, Blackwall was considered a very imposing station, and as it now exists in nearly its original form, it is an interesting landmark in London's railway history. At the present time very few passengers are seen at the station which, consequently, has a deserted appearance and an air of departed glory. The old roof has recently been removed and is replaced by a platform awning. There is one long platform with a short bay line ; the latter is now disused, but formerly accommodated trains of the North London Railway when that Company maintained a Broad Street–Blackwall service, between September 1, 1870 and June 30, 1890. The junction between the two railways at Poplar, over which these trains travelled, was removed in 1900. Previously (from 1851 to



SOME LITTLE-KNOWN BRANCH RAILWAYS IN LONDON.

* Vide *Our Home Railways.*—W. J. Gordon.

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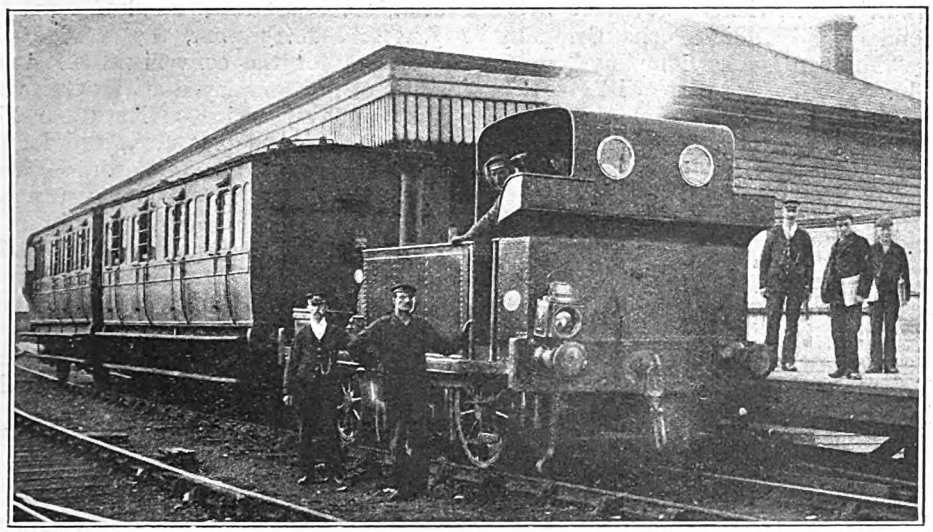

MILLWALL EXTENSION RAILWAY.
Passenger Train at North Greenwich Station.

1868) the North London Railway had used Fenchurch Street as one of its termini.

Returning from Blackwall, we alight at Millwall Junction for a trip over the Millwall Extension Railway to North Greenwich and Cubitt Town station. The length of this railway is but 1 mile 49 chains, and of this total, the Great Eastern Railway is owner of 36 chains and the Port of London Authority of 1 mile 13 chains. The latter length was formerly divided in the proportion of 41 chains to the London and India Docks Company and 52 chains to the Millwall Docks Company, but since 1909 these undertakings have been absorbed by the Port of London Authority, who, as successor to the Millwall Docks Company, now works the line with its own engines. Of the Great Eastern mileage, 5 chains are at Millwall Junction and 31 chains at the North Greenwich end.

The line, opened for passenger traffic on July 29, 1872, is single, with intermediate stations at South Dock and Millwall Docks, the former being the crossing place. On account of the line crossing three swing bridges, and the permanent way being of light construction, engines and carriages have necessarily to conform to existing conditions, and, as a matter of fact, the engines are the smallest standard gauge passenger locomotives in the country. They are 2-4-0 side tanks, with 9 in. by 18 in. cylinders and 3 ft. 6 in. wheels, and were supplied by Manning, Wardle and Co. in 1880 to the Millwall Docks Co., but they now belong to the Port of London Authority.

Trains are usually composed of two old Great Eastern four-wheeled coaches, lighted by oil lamps. Six-wheeled stock is prohibited from running over the line. Previous to 1880, the Dock Company would not allow engines in steam to cross the swing bridges, so a single horse-worked coach ran the passenger traffic to the Dock boundary, a Great Eastern engine taking charge at that point. The train service used to be a 15 minute one, two trains being in the working, but since the war only one train is run, and this provides a half-hourly service each way. South Dock Station is open only between 7 a.m. and 6.30 p.m., and on Sundays the line is closed entirely.

To those who specialise in collecting railway tickets, the Millwall Extension Railway formerly provided a happy hunting ground, as specimens of three Companies' tickets could be obtained. At either terminus Great Eastern tickets were issued, but at South Dock and

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Millwall Docks, tickets would be headed "London and India Docks Company" and "Millwall Docks Company" respectively. The line (or part of it) and docks now being the property of the Port of London Authority, current tickets issued at intermediate stations are headed accordingly. On the reverse side of the tickets it is stated, "The Great Eastern Railway Company and the Port of London Authority do not hold themselves responsible for any delays which may arise in the docks through the necessary opening of the swing bridges."

To complete our investigations in this neighbourhood, we next proceed to Custom House station, which may be reached from either Fenchurch Street or Liverpool Street; or, if more convenient, by means of the cross country (or rather "across London") trains which work between Palace Gates and North Woolwich. This service is recommended to those who would improve their geographical knowledge of the Great Eastern system, as between Seven Sisters and Stratford the train takes a complex route through a vast number of curves and past a constant succession of junctions and avoiding lines, which can only properly be understood by reference to a map at the time of travelling.

Custom House station is the junction for two branches that run to Beckton and Gallions respectively. The first of these, opened March 18th, 1874, is a single track line, 1 mile 65 chains in length, and belonging to the Gas, Light and Coke Company, but leased and worked by the Great Eastern Railway. There is one intermediate signal box, known as Beckton Tramway Crossing, where a tramway crosses the railway on the level. Beckton, a one platform station, is the terminus for passenger trains, but the line continues into the works of the Gas, Light and Coke Company, whose very extensive private railway, comprising some 40 miles of track within an area of half a square mile, was described in the March, 1908, issue of the RAILWAY MAGAZINE.

Beckton trains run to and from Stratford Low Level, there being five each way daily (six up on Saturdays). Down trains reach Beckton at such irregular times as 5.37, 6.58 a.m., 1.33, 4.11 and 9.33 p.m., and up trains leave at 6.20 a.m., 12.28 (Saturdays only), 2.31, 4.18, 5.24 and 10.15 p.m., the service being arranged for the convenience of various shifts of men employed at the Gas works. On Sundays, trains arrive at Beckton at 5.38 a.m. and 9.33 p.m., and leave at 6.27 a.m. and 9.42 p.m. for Stratford. As a contrast to the dismal surroundings met with between Fenchurch Street and Custom House, the run thence to Beckton is through open fields, within sight of the Docks, whilst glimpses of the Kentish hills are seen in the distance.

The second branch line from Custom House station is the passenger railway belonging to the Port of London Authority. It diverges from the Great Eastern Railway at Royal Albert Docks Junction and proceeds to Gallions station, a distance of 1 mile 61 chains.

Originally opened for passenger traffic on August 3rd, 1880, the line was for a number of years worked by the London and India Docks Company, the then owner. Three 2-4-0 side tank engines, purchased from the London and North-Western Railway, were employed on the passenger service between Custom House and Gallions. When built at Crewe in 1849 as tender engines, they were numbered and named, 238 *President*, 250 *John o' Gaunt*, and 431 *Hercules*, but subsequently became Nos. 1918, 1927 and 1911 respectively. The London and India Docks Company numbered them 5, 6 and 7, in its locomotive stock. These engines, which were of the familiar "Crewe Goods" type, continued at work until June 30th, 1896, after which date the Dock Company ceased to run passenger trains, and the Great Eastern Railway has since provided engines and carriages for the purpose.

After passing Royal Albert Dock Junction, the permanent way changes from bull-headed to flat-bottomed rails. The stations (four in number) also differ considerably in appearance from those of the Great Eastern Railway, and time-table sheets bear the unfamiliar railway heading "Port of London Authority. Royal Albert Dock Railway." Trains run at about 30 min. intervals on week days only, and mostly work through to and from Fenchurch Street, though quite a number of locals are to and from Custom House only, these being accommodated in a bay at the back of the down platform at that station.

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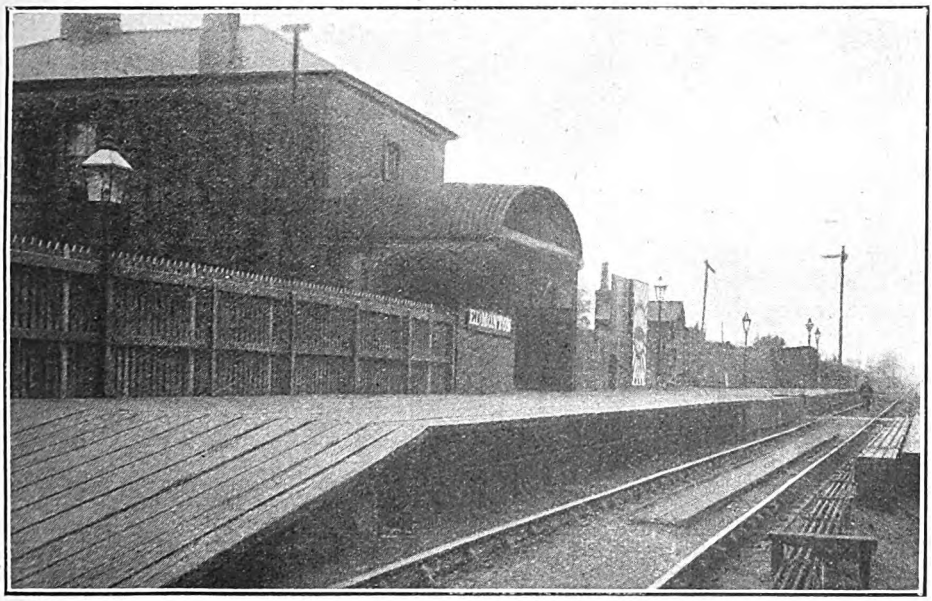
The Port of London Authority was created by Act of 1908, and absorbed, as from March 31st, 1909, the London and India Docks, Millwall Docks and Surrey Commercial Docks, besides other undertakings. Its control of the River Thames and Docks extends from Teddington Lock to a point midway between Leigh and Westcliff. In 1909 the Port Authority became possessed of 36 locomotives, Nos. 1 to 19 being those taken over from the London and India Docks; Nos. 20 to 26 those from the Tilbury and West India Docks; whilst Nos. 27 to 36 were ex-Millwall Docks engines. Since then a number of 0-6-0 outside-cylinder side-tank engines, supplied by Andrew Barclay and Co. and Hudswell Clarke and Co., have been added to the stock, these being numbered from 37 upwards. The engines are painted bright red.



Photo] [*H. L. Hopwood.*

EDMONTON LOW LEVEL STATION (GREAT EASTERN RAILWAY) LOOKING NORTH.

A little-used Great Eastern Station in the London district is Edmonton Low Level, situated on the link line that extends from Angel Road Junction on the Cambridge main line to Edmonton Junction on the Enfield branch. It is a single line, 1¼ miles long, and forms part of the original branch to Enfield, which, opened March 1st, 1849, then diverged from the main line at Water Lane (now called Angel Road). This was, of course, many years previous to the construction of the present Enfield line from Bethnal Green to Edmonton Junction, via Hackney Downs, which dates from July, 1872. On the latter line, a new Edmonton station, adjacent to the old one, was opened, and with the diversion of most trains to the new route, it followed that the old station lost much of its former traffic. The original building is still doing duty, and the station retains many of its old time characteristics. At the south end there is a level crossing, and a few years ago an additional platform, to accommodate workmen's trains, was built on the other side of the road, but on the same side of the line as the original platform. Through the station there is also a footpath, with steps cut in the platform. The footpath is normally kept open, but on the (not very frequent) approach of a train, gates are shut across the path and the steps are covered by a hinged iron flap let down flush with the platform top.

Although trains on the branch are few and far between, for some reason Edmonton Low Level was not included in that formidable list of "stations closed"

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which the Great Eastern authorities issued in 1916. The booking office, however, is closed, and passengers are directed to obtain tickets at the High Level station across the road. So far as passenger trains are concerned the Low Level station is a terminus, but some of the up workmen's trains start from Enfield as empty coaches. At present there are three up trains in the early morning, and one up and down on Saturdays only, the latter running between Edmonton and Stratford. On Sundays the station is closed entirely. A few of the Enfield goods trains travel this way, as do also those for Churchbury loop line stations.

As the up starting signal at Edmonton is situated immediately in front of the signal box, but too high to be properly sighted by the signalman, a repeater in the form of a miniature arm and lamp is fixed lower down the post, but at right angles to the semaphore, and facing the signalman.

The single line Hammersmith branch of the North and South-Western Junction Railway is very much off the beaten track to-day, as it has been closed for passenger traffic since January 1, 1917. The branch was opened on May 1, 1857, and at that date the junction with the main line was at a point known as Acton Gatehouse. At first the Hammersmith branch service was provided for by a through coach to and from the North London line, the coach being slipped from down trains at the junction, whilst up trains stopped there to attach it. This through service was given up when Broad Street station was opened in 1865, and the branch train then ran only between Acton and Hammersmith. As the junction faced in the wrong direction for Acton, the coach was *propelled* from the junction to the station. This working remained in force until 1880, when the branch was extended to a new station at South Acton, and the latter has since then superseded Acton as the junction for Hammersmith.

For many years the branch was worked by North London engines of the 105 class, stationed at South Acton. Of the four engines of this class, Nos. 107 and 108 were generally at South Acton, and Nos. 105 and 106 at Bow; the latter for running the Bow and Plaistow service. They were 4-4-0 inside cylinder engines, built at Bow in 1863–4, and very similar to the better known 101 Class, but with coupled wheels only 5 ft. 3 in. in diameter.

When the working agreement between the London and North-Western and North London Railways came into force in 1909, a London and North-Western rail motor displaced the North London engine and train, and the motor continued at work until the closing of the line.

The branch being only about 1¼ miles in extent, for a long time there were no intermediate stations, but within the last ten years three halts had been erected. "Hammersmith and Chiswick" station, as it is called to distinguish it from other railway stations serving the district, is very quaint, the booking, &c., offices—which have more the appearance of a private house than a railway station—fronting immediately on to the main road. There is no sign of the railway proper until we pass out of the booking office by a back door, where we might expect to enter a garden, but in reality reach the platform. Accommodation is scanty, there being but one platform with waiting shed; and, of course, only one line, with a run round loop. Two trains an hour was the service, but traffic on the branch was never heavy, and it seems unlikely that the line will be re-opened for passenger traffic in the future.

Whilst on the territory of the North and South-Western Junction Railway, we may pay a visit to the disused station at Kew, which is situated close to the junction with the London and South-Western Railway between Kew Bridge and Brentford Stations. The down platform and offices are still intact, the latter being used as a dwelling house. The up platform does duty as a kitchen garden, but distinct traces of its original purpose are visible. This station — opened August 1, 1853—fell into disuse in 1862, when North London passenger trains were diverted to the present Kew Bridge station, and the section of railway between Kew Curve Junction and the junction with the London and South-Western Railway (42 chains) is now ordinarily used only by goods trains.

By way of concluding these disjointed notes, reference will be made to a disused railway in the heart of London, the existence of which is unknown to

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most people because the line is in a tunnel under the river Thames. It belongs to the City and South London Railway and extends from near London Bridge station to the original terminus at King William Street, a distance of 65 chains. Its situation under the river is on the west side of London Bridge, and on reaching the Middlesex shore the line curves sharply to the east and comes to an end at King William Street station. When, in February, 1900, the first northern extension of the City and South London Railway was opened to Moorgate Street, it became necessary to abandon the original terminus and to make a new line under the river at a lower level. The present line is on the east side of London Bridge and crosses (on the Middlesex side) under the original line. The street level offices of the old terminus—situated at the corner of Monument Street and King William Street—are now used as shops.

Copyright] **SIR GUY GRANET,** *[J. Russell & Sons.*

General Manager, Midland Railway, 1906–18.

SIR GUY GRANET, who retired from the position of General Manager on December 31st, 1918, has accepted a seat on the Board of Directors of the Midland Railway Company. Sir Guy, who was knighted in 1911, was a Lieutenant-Colonel in the Engineer & Railway Volunteer Staff Corps when war broke out. He was made Deputy-General of Movements and Railways in 1917, following the appointment of Deputy Director-General of Military Railways in 1916, but in March, 1918, he resigned the appointment in order that, at the request of the British Government, he might visit the U.S.A. on food transport problems. He has also been a member of the War Council. Sir Guy Granet was largely instrumental in installing the system of cross-channel train ferries between England and France. He is succeeded as General Manager, Midland Railway, by Mr. F. Tatlow, C.B.E.

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Locomotive Whistles.

By H. C. WEBSTER, Inter. B.Sc., M.I.Loco.E.

ALTHOUGH, perhaps, to many the whistling of engines constitutes no more than a warning that a train is approaching (unless the observer chances to reside adjacent to a goods yard, when it is apt about midnight to be considered a contraption loaned from nether regions), it nevertheless forms an important part in the manipulation of traffic, and is not without interest from theoretical standpoints.

The whistle as a mechanical contrivance possesses few features, and usually comprises an inverted gunmetal bell, the mouth being downward and brought to a sharp edge, which, by means of the central stem, is fixed directly over an annular opening in the base.

When in use the steam issues from this annular ring with a very high velocity, and impinging on the edge of the bell-mouth sets this into vibration, and causes it as a consequence to emit a note that varies in pitch according as the bell is large or small.

Steam is usually admitted to the base of the whistle by means of a coned mushroom valve kept up to its seating by the pressure of steam in the boiler and opened by a short lever, the major arm of which is connected to the cab by means of a strong cord or slight chain.

It will thus be seen why the muffled whistling of an engine, which sometimes takes place for a short interval when steam is being raised, indicates a growing pressure, being insufficient to keep the valve tight up to its seating, but enough to reach the bell and set this into moderate vibration.

The standard whistle most commonly used on English railways is shown in Fig. I, and the Caledonian or tube type whistle in Fig. II, this latter is the same in its operation, but a brass or gunmetal tube about 12 inches high is substituted for the inverted bell, and vibrated by means of two lips that are cut in its sides near the base on similar principles to the closed organ pipe.

The two main functions of the locomotive whistle are to give audible warning of approach (to which was due its inception), and as a means of signalling between driver and signalman or shunter; it is further used in some cases to form a communication between the driver and guard or others of the train staff through the medium of a cord secured to some part of the train.

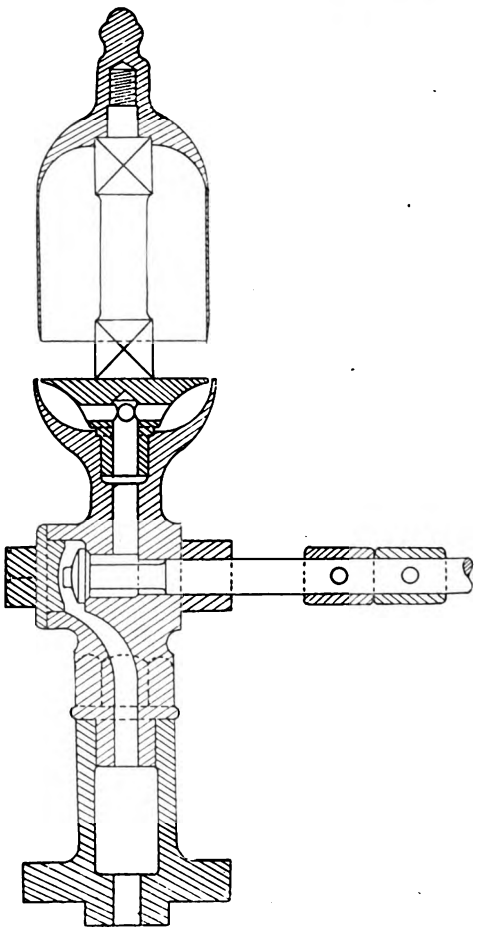

FIG. 1.—STANDARD LOCOMOTIVE WHISTLE.

Instances of the first-mentioned use are obvious, and would be of little interest but for a rather peculiar effect produced by the passing at high speed of any sounding body, which results in a rise and fall in the pitch of the note emitted as, in this case,

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the train approaches and recedes from the observer.

This effect is known as the "Doppler Effect," and the principle involved the "Doppler Principle," by whom it was first investigated, and is due to a combination of the velocities of sound and of the sounding body.

Supposing the frequency of the note emitted by the whistle is n vibrations per second, then there will be a succession of waves produced in the surrounding air, the frequency of which will also be n, hence the number of sound waves that reach the observer due to the sounding of the whistle independent of its motion, will be n per second, and he will hear a note of pitch n.

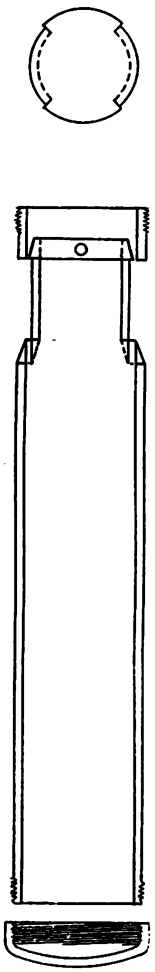

FIG. 2.—CALEDONIAN RAILWAY TYPE LOCOMOTIVE WHISTLE.

But (assuming the train to be approaching the observer) he hears in addition to these n waves a certain number extra in each second, for at the end of the second the engine is nearer him than it was at the commencement, and his ear will have received the waves which at the commencement of the second occupied this space.

The result is that he now receives more than n waves per second, and the pitch of the note he hears will be higher than n.

When the train has passed the observer in the same way the pitch of the note heard will be lower than n.

This change of pitch can be easily calculated if so desired, for suppose the frequency of the note emitted by the whistle be n vibrations per second, and the train approaches the observer with a velocity v, the velocity of sound in air, measured in the same units, being V, and L the wave length of sound, then in a space of v there will be v/L waves.

Hence, since the train travels a distance v in one second the ear of the observer will pick up, owing to this motion alone, v/L waves, so that the total number of waves received in a second will be

$$n+v/L.$$

Now $n \times L = V$, so that the pitch of the note heard is $n+nv/V$, or

$$n\,(L+v/V).$$

Similarly, when the train has passed the observer and is receding the pitch of the note heard is

$$n\,(L - \mathrm{v/V})$$

The momentary alteration in pitch that occurs when the train passes under bridges or emerges from a tunnel is not the Doppler effect but caused by the interruption and reflection of the sound waves.

The use of the whistle as a signalling medium is extensive and some railways go to the length of providing a separate and distinct whistle for this purpose. At all termini and junctions is a code of whistles by which the driver indicates to the signalman that his train is ready to leave by a certain line when the signal for that line is pulled off.

The code may comprise a "long," "short," "distinct," "crow," or any combination of these and there is usually set out in the company's appendix a list of the different whistles and the roads to which they apply.

In addition to these "Special Direction" signals there is a standard code which applies to all stations, junctions and sidings not otherwise specially provided for and to all running trains.

A type of such code as used on the Great Central Railway is given in the following table :—

Standard Code of Engine Whistles, G.C.R.

Movement.	Signal.
Main line	1 long.
For a train approaching a Junction on a main line, and intending to proceed beyond the junction upon a branch line :—	
If leading to the left ..	2 long.
If leading to the right ..	3 long.
To cross from main to main	4 short.
Down main and down sidings	2 short.
Up main and up sidings ..	3 short.
Down main and up sidings	2, pause, 3 short.

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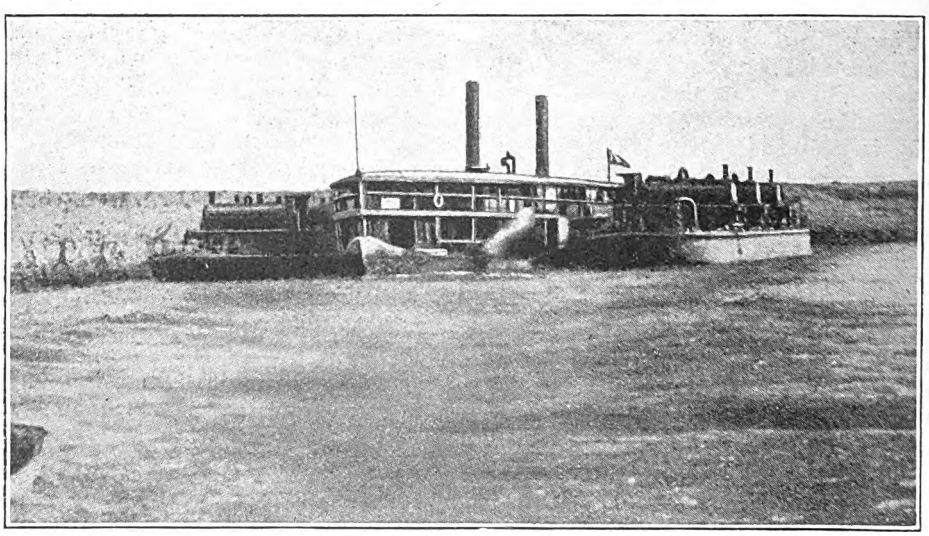
Movement.	Signal.
Up main and down sidings	3, pause, 2 short.
Main and loop	1 long, 1 short.
Main and No. 2 loop ..	1 long, 2 short.
Main and No. 3 loop ..	5 short.
To indicate that the whole of a train has entered a siding and is clear of safety points	1 short, 1 crow.
Engine shed road and main	2 long, 1 short.
Engine shed road and goods	2 long, 2 short.
Up and down sidings ..	3, pause, 3 short.
Turntable road	6 short.

There are many other subsidiary signals which differ for different railways for instance, as an indication that a goods train booked to call at a station or siding has nothing to detach and will not stop if given a right away hand signal (Great Eastern Railway practice two crows on approaching the station or siding) when approaching swing bridges, occasionally to acknowledge the Guard's right away signal, and also, after being stopped by a signal, in acknowledgment when this is lowered, though on some railways, notably the North Eastern Railway this last use is not encouraged.

In order to obviate the excessive noise that would occur through whistle signalling at some of the main stations, electric bells and indicators are provided in the signal boxes operated from the platforms by the enginemen, as at York.

In cases where the engine has to travel along, or continuously cross, a public thoroughfare, *e.g.*, the Wisbech and Upwell Tramway, the use of the whistle would constitute both a nuisance and, by frightening horses, a source of danger to other users of the road, and for this reason such engines are provided with a deep toned bell, which is operated by the engineman and used on these occasions, a noticeable peculiarity of railway working in the United States of America.



Photo]. [*H. J. Smith, (R. W. Kents.)*

BRITISH ENGINES OVERSEAS

London and South-Western Railway Locomotives being barged on the River Tigris, Mesopotamia.

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A Proposed Regrouping of British Railways.

By BASIL MERCER.

THERE appeared recently in one of the comic papers a remark to the effect that the war, when it at last came to a welcome finish, would be greatly missed by everyone. Enlarging on this theme, certain authorities, of more or less eminence, have expressed a fear that Peace will bring with it a terrible state of stagnation in the national mind. It may be doubted whether the Minister of Reconstruction or any other responsible thinker would agree with this theory: to judge by the evidence of daily events the directly opposite view is being taken; on all sides we hear of innumerable plans and schemes, and of an infinitely broader outlook all round. In an industrial community such as ours, transport is of paramount importance; in spite of this transport matters in the past have rarely had the attention they deserved.

With the advent of Peace it will be necessary to turn to the railways and grapple boldly with difficulties which have escaped observation hitherto. We are entering upon a new epoch of history; there must be no looking back to the "good old times" (which were not so very good, after all). Wonderful progress has been made in nearly every mechanical device that can be, or is, used on railways; all that remains for us is to take advantage of these improvements and see that they are used to the full benefit of our British lines.

STATE OWNERSHIP.

Without going into the arguments *pro* and *con* on the question of State ownership, it is apparent to all careful observers that "something has got to be done." The Great War has altered many things in the social cosmos and has entirely changed economic values in certain directions. For one thing, it has made the financial position of the railway companies acute. Here, there can be no question of profiteering, nor (which is more important) can any large profits or revenues be seized for national purposes; railways are amongst the only great commercial concerns which have not done well for themselves out of the upset caused by the war. Certain facts stare us in the face; on the one hand, we have an imperative demand for cheaper transport for both passengers and merchandise, together with increased working expenses due to the great jump in the price of materials and to higher wages. Therefore, unless the railways can reduce their working expenses to a very considerable extent, the State will inevitably have to step in and take them over.

Many people will say that such a drastic move is undesirable and unnecessary, but these same people are very shy of suggesting any practical remedy. The two items of expense which I mentioned will probably increase rather than diminish, while any increase in fares or goods rates is absolutely out of the question; in fact, both these will have to be brought down to pre-war standards, if not lower, if the business of the country is to be conducted successfully. All that is left is to see what can be done in the way of making the railways more efficient and eliminating waste. We have got to remember, when unfavourable comparisons are drawn between our railways and those on the American Continent, that railways developed here rather sooner than anywhere else; the way of the pioneer is invariably hard, and future generations have to pay for the sins of their fathers. In addition, the United States is a new country where the state encouraged railway construction instead of putting every obstacle in its way and dowering the unfortunate shareholders with tremendous legal expenses, as the government here has done.

If we wish to institute a comparison between British lines and those of other countries we ought to take some better analogy, preferably an old country like our own, and one where the traffic conditions are as nearly as possible similar;

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for this purpose let us choose France, which in size, population and geographical features resembles our island more closely than any other land. Here, we see the results of a very wise policy in the past which has given great benefits to the present-day shareholders. Taking Paris as a centre,—the railway system of that country has been developed from there—it is as though an orange had been cut across and the land divided into segments of a circle between the different companies, so that one company very rarely infringes the territory or sphere of influence of another. This wise lay-out in the first instance has saved many millions in construction and has given a splendid return to the owners; at the same time, it cannot be said that the facilities provided were either costly or inadequate. Compare the speed of the trains between Calais and Paris, or the Côte d'Azur Rapide of the P.L.M., with most services from London. And though speed is the most costly of all railway luxuries, the Nord manages to pay its shareholders no less than 25 per cent!

THE RAILWAY DIVISION OF FRANCE.

I have quoted the territorial railway division of France as a source of economy; it will be noticed, of course, that the business of that country is conducted by only six large systems (the Nord, Est, P.L.M., Midi, Orleans and Etat), as against some 16 *large* companies in Great Britain, not to mention the enormous number of small, though important, lines in various parts of the country. Why should not some system of geographical distribution, similar to the French, be adopted here? The attendant economies from the territorial arrangement are too obvious to need discussion, while the other saving from the consolidation of *matériel* into fewer divisions is also fairly plain; the pooling of wagons under our war control scheme has been of immense benefit both from the economic and traffic point of view. In other words, let Great Britain be mapped out like France as regards its railways, and let the shareholders pool the value of their holdings. To anyone who says that it would be impossible to work this out, I would reply that it would be no more difficult than fixing a fair value to the various kinds of stock if the Government takes over the companies; the shareholders interested could appoint committees to arrange for the guarding of their interests, and each committee could have a chief officer of the line in question as an advisory member.

A SUGGESTED DIVISION OF ENGLISH RAILWAYS.

The actual subdivision would be by no means a difficult matter. For the purpose of this sketch I have roughed out a scheme whereby our numerous railway companies become reduced to six, the same as in France, though this coincidence of numbers was the result rather of accident than design; my suggestion is that England should be divided into four railway provinces, and Scotland into two. Let us try to imagine what this would mean.

The four companies might be called Southern, Western, North Western and North Eastern. Taking the first-named, it would include all lines south of the Thames, from Ramsgate in the east to Exeter in the west, with London approached by all the lines of the present South Eastern and Chatham, Brighton and South Western Railways. This would form a compact and easily worked railway province; the abolition of competition in sparsely-populated districts would cause sections of line to be remunerative that have been the despair of every manager almost from their construction. The mileage of this division would not be so great as that of the others, but this would be compensated for by the immense importance of this stretch of country: it includes nearly all the principal holiday resorts within easy reach of London; it would control the greater part of the suburban lines; and, most important of all, the chief routes to the Continent would fall under this administration. The possession of the Channel Ports would mean the control of all the short sea routes, the Channel Ferries and the Channel Tunnel, if or when this latter is ever made.

Turning to the Western system we are confronted with a much larger tract of country, but one in which there are many considerable pieces of "bad" land, from the railway point of view. This company would own and work all the lines north of the Thames between London and Penzance in the west, and all the

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West Midland and Welsh lines south and west of a line drawn from London through Birmingham to Aberystwith. It would meet the Southern company at Exeter, and the North Western at Birmingham and the principal junctions in Central Wales. Practically all Devon, in addition to the far west, would fall to the share of the Western Railway; it would touch the prosperous Birmingham section and would reign as sole monarch in the enormously valuable mining parts of South Wales. These districts would offer some compensation for the by no means negligible lengths of unremunerative line which are put in with this railway.

Continuing our survey, the North Western comes next, and is aptly described by its name. This company would own the lines from London to North Wales and Carlisle; its boundaries would be:—London, Birmingham and Aberystwith on the southern side; and Nottingham, Sheffield and Leeds on the eastern. It would embrace all the existing London and North Western lines except those in South Wales; the whole of the present Great Central system, except lines east of Sheffield; and all lines west and north-west of Leeds. The main line traffic would be heavy, so this company has been provided with three main lines from London to Lancashire, the present London and North Western, Great Central and Midland routes. This arrangement provides a solution of the competition difficulties as regards these important trunk routes, and also of the overlapping systems in Lancashire and the West Riding of Yorkshire. The major portion of the Irish business would be in the hands of the North Western, and it would exchange its Scotch traffic at Carlisle with the Scottish Central Railway.

In the scheme of the North Eastern Railway we show the whole of the Great Eastern system; the bulk of the Great Northern and North Eastern Railways; and all lines east of the Midland main line, including Great Central, Hull and Barnsley, and Lancashire and Yorkshire lines. This company would meet the North Western at Nottingham, Sheffield and Leeds, and own the lines connecting the two last-named towns. We should see a somewhat similar system to the Western; there would be a long main line, several immensely valuable tracts of country, and a fair proportion of lines in purely agricultural districts. The three cross-country lines, Northallerton-Hawes Junction, Darlington-Tebay, and Newcastle-Carlisle would become the property of this company, which would hand over its Scotch traffic (to the Scottish Central) at Newcastle, as this town forms a far more convenient exchange point than Berwick-on-Tweed. The Great Eastern system has been grouped with this set of lines, an arrangement which gives the proposed North Eastern Railway a relief main line from London as far north as Doncaster; this would be necessary for dealing with the South Yorkshire trade.

REGROUPING SCOTLAND.

By regrouping Scotland has been divided into two systems instead of the present five large railways, and the almost infinite number of joint lines and running powers would disappear. The Scottish Central, which I mentioned before, embraces the southern part of the country and a certain amount of territory in England—its lower extremities would terminate at Carlisle and Newcastle; it would extend up to Edinburgh and to the south side of the Forth, to Stirling, and to Crianlarich. This division keeps the sphere of influence of this company very clear and distinct; it would be an easily administered and very valuable property. The principal junction points with its northern neighbour would be at Edinburgh (the Scottish Northern being given running powers from the Forth Bridge as a matter of convenience), at Stirling for the traffic from the present Caledonian lines, and at Crianlarich on the West Highland. This last arrangement keeps the Oban and Fort William-Mallaig lines clear of dual ownership, while the extension of the Central Railway so far out of its district obviates the intrusion of another company in the area north of the Clyde and west of Glasgow.

There only remains the Scottish Northern Railway, which presents a very simple problem. To this company would fall the important Fife coal district; the Perth, Forfar, Dundee and Aberdeen lines; and all the Northern and Western Highlands. The troubles of competition for the English traffic would be abolished,

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and the exchange points seem to follow the natural trade of the country and its physical features, while the working would be simplified to an enormous extent.

THE ADVANTAGES OF RE-DISTRIBUTION.

This completes the survey of the suggested re-distribution of British railways; it only remains for us to glance at the summary of advantages which would follow the adoption of some such scheme. One would be the simplification of the work of the Railway Clearing House, and the abolition of many points of disagreement which have led in the past to acrimonious and unsatisfactory settlements. Another far greater benefit would come from the reduction in the great variety of types of engines and other kinds of rolling stock; it might be possible to get rid, once and for all, of the anomaly of using two varieties of brake which now obtains. Again, the companies being stronger financially would enable many improvements to be carried out, such as widenings, and the enlargement of out-of-date goods stations. Competition would practically cease; the advantages of it seem very obscure as regards benefit to the trading and travelling community, while the disadvantages to the companies' balances are too obvious to merit further mention. The rolling-stock problem will be specially pressing after the conclusion of war troubles, in view of the immense amount of repairs and renewals which will be necessary. It is too soon yet to say whether there will have to be a higher fare for high speed trains, which is the general practice in every other country; such a charge cannot be stigmatised as unreasonable, for there can be no doubt that the great extravagance in railway working is the running of fast expresses with all the attendant costs of maintenance and construction. A network of light railways (as suggested in my article in the November issue, 1918), would probably cause lines now worked at a loss to bring in a very handsome profit, at the same time adding to the trading facilities of the country.

A GENERAL TRANSPORT DEPARTMENT.

Arising out of this re-grouping scheme, one important detail clamours for attention. Many people would agree with the economic aspects of the idea, but would object that it might be very unwise to create such large and powerful monopolies which would have a throttling effect upon the internal transport of the country. Without agreeing with this fear—the examples of the North Eastern, Great Western and Highland Railways alone go to prove that this is not a ground for serious alarm, as these three companies have done much to aid development in neglected corners—I can conceive a somewhat better mode of control than the present Board of Trade method. There should be a Railway Board or rather a general Transport Department, which would look after all matters dealing with carriage: it should have wider powers than the present board; for example, it ought to be able to deal with the granting of powers for new works, thus obviating the tremendous waste of time and money caused by promoting a Bill in Parliament. The composition of the Board in question might be a little more representative of the interests involved, and cease to be an archæological curiosity; we could say farewell to the Speaker of the Irish House of Commons (?) and the Archbishop of Canterbury as members of such a board without feeling much grief. The new Board ought to include a member of the Government, representatives of the traders and travellers (season ticket-holders' associations, for example), delegates from the Shareholders' Association and the great Railway Unions, and one or two independent members; these latter, if they were persons of wide sympathy and experience, would soon prove their usefulness to their colleagues. Nor must there be any more secrecy about matters connected with railway administration; one would have thought that there was some crime in contemplation from the vigorous attempts to prevent any idea of the actual method of railway work from escaping into the outside air. As a consequence of this policy, railway managements have been misjudged; traffic problems have been grossly misunderstood; and an atmosphere of rancour has been allowed to pervade what should have been a commercial and scientific undertaking. Open diplomacy is the order of the day; there is much new wine in the making; it is for us to see that it is put into new bottles, if we wish to avoid commercial disaster.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

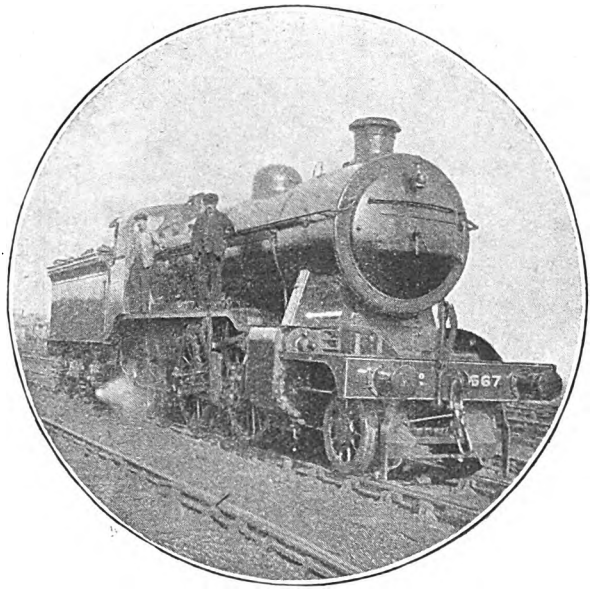

Photo.] [*Chas. S. Lake.*

GREAT NORTHERN RAILWAY.

No. 1667, one of the new 2-6-0 type engines built by the North British Locomotive Co., Ltd., Glasgow.

OUR subject for discussion in this month's issue, as foreshadowed in January, is that of future possibilities in scheduled speeds. The topic arises in the first instance out of the concluding sentence of my century article in October last, which read: "The runs here tabulated constitute collectively a magnificent tribute to the express locomotives of Great Britain, and I do not doubt that, if I am privileged in future years to add a second to my first century of these articles, and if during the coming period time-table development is allowed to proceed on a scale commensurate with the constant development of express locomotive tractive power and efficiency in these islands, the second century article will contain a series of runs overshadowing even these peerless achievements."

Quoting this passage, a correspondent who has by several well-reasoned articles in contemporary journals proved himself a strong advocate of really high speeds, writes me as follows: "I suppose the very guarded remarks as to possible future schedules with which your article ends are the most to which you feel able to commit yourself. I feel that with our modern permanent way and locomotives, it is a pity that we cannot at least equal the best French and American speeds, if only for the sake of advertisement. If *Wild Duck* can average a mile-a-minute from Euston to Crewe with 410 tons, what might she not do with 250? Special expresses at special fares, maintaining a 65 m.p.h. average speed, on, say, the London and North Western, Great Western, and North-Eastern main lines, and at proportionately easier speeds over harder routes, might very well pay their way directly, as well as give the indirect advantage of the advertisement. The argument that the time saved by accelerations of a few miles an hour is too trivial to be worth the expense, never did appeal to me much. If it had prevailed in the past, our expresses would still be running at the speeds of the 'forties. But 65 m.p.h. from London to Manchester, for instance, would mean a journey time of 2 hours 50 min., and a saving, on a return journey—as compared with the best pre-war express service—of an hour and 20 min., which could not be called trivial. Similarly in other cases. Please enliven my life of routine," the

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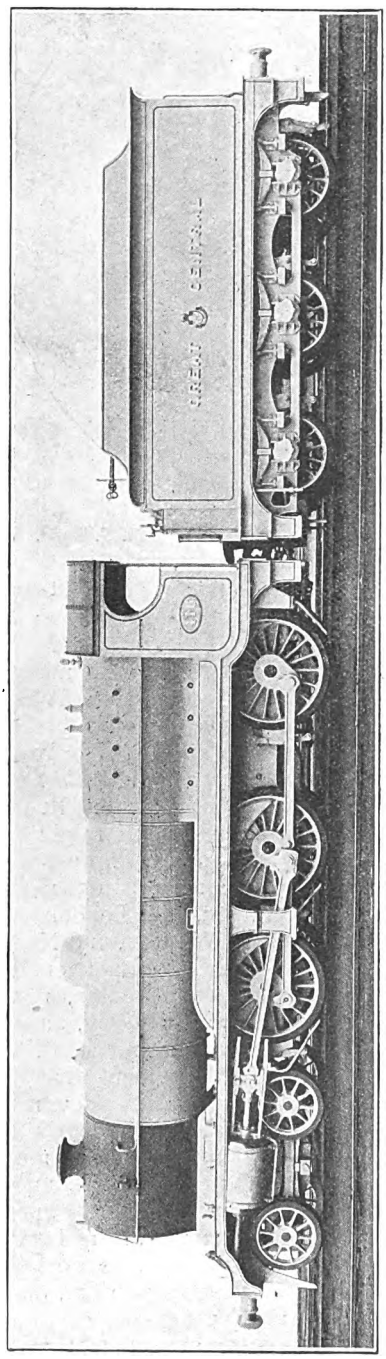

GREAT CENTRAL RAILWAY.
4-6-0 Mixed Traffic Locomotive, No. 416, fitted with outside cylinders.

letter concludes, as it was addressed to me from the resort in which the writer was doing his bit for the common weal, "by a discussion of possible schedules for 250-ton expresses!"

Most willingly will I respond to so pathetic an appeal, although I am not sure that the discussion will find the appellant still confined to the routine of which he speaks. For since the penning of my remarks which he quoted, and his comments concerning them, events have happened which have changed profoundly the outlook in these matters. In the first place the conclusion of the armistice has brought within the region of practical politics a restoration, even if it be gradual, of travel conditions resembling at least in some degree those which obtained before the war. So the question my correspondent raises is now in every way a topical one. On the other hand, the declaration recently made of the intentions of the Government in regard to the nationalisation of railways, whatever may be the form taken by that transaction, has a strong bearing on the subject of future speeds, for the obvious reason that the stimulus of inter-railway competition will no longer exist. My friend's arguments as to the value of rapid train services as a means of advertisement therefore go by the board at once.

The question of very fast trains therefore becomes one of simple economics. Briefly, do high speed expresses pay? That depends entirely on the conditions under which they are run. If we consider, as an example, the trains comprising the pre-war 2-hour service between London and Birmingham, the bulk of which left at times almost exactly corresponding from the termini of each route, and in some cases loaded only to four or five but moderately-filled bogie vehicles, I think it highly probable that a number of them, as individual trains, did *not* ultimately pay a return on the cost of their operation, even if the service as a whole may have done. Competition, that is to say—however beneficial it may have been to the general public—led to duplication of facilities, for the enjoyment of which, moreover, no extra charge was demanded of the traveller, and was thus wasteful and uneconomical. But supposing, on the other hand, that by agreement between the

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competing companies, the non-stop Birmingham expresses, accelerated to a standard time of 105 min., had been cut down in number to one, say, every two hours, by each route alternately, six in all in each direction daily at 9 and 11 a.m., 1, 3, 5 and 7 p.m., with limited accommodation and a supplementary charge of, say, ½d. per mile to passengers of each class. The crack trains would thus be reduced from a total of 40 to 12 in all. If the remaining fast trains, or as many of them as it was found necessary to run, served the important intermediate stations, and therefore occupied 2¼ or 2½ hours on their journeys, passengers by the limited expresses would secure a definite advantage in time in exchange for their extra payment, while, with such a business traffic as that existing between London and Birmingham, the trains would be pretty well assured of a regular *clientele*.

I do not, however, propose to argue the question again from the standpoint of desirability, as I did so at length in the April issue of last year; in this connection let it be remembered that the accumulation of saved half-hours in course of time spells days of time economised, especially in the case of those who like myself travel constantly on business, and to whom a really fast special train service of this character might make all the difference of three, say, in place of two business appointments in different towns on the same day. The value of such expresses is, I think, admitted without question. Similarly the ultimate profit of these fast trains to the proprietors, whether individual companies or the State, need not be disputed, provided the supplementary charges exacted for the greater services rendered to the traveller be adequate to the increased cost of working them. But what of the operating side of the matter, from the locomotive standpoint? What are the scheduled speeds possible of maintenance by the modern express locomotives of Great Britain? Here we are on more debateable ground.

Most of the advocates of high speed seem to me to be rather more revolutionary than practical in their suggestions. The times that they advocate could doubtless be observed under ideal conditions. But a *sine qua non* in the case of train services for the use of which a special

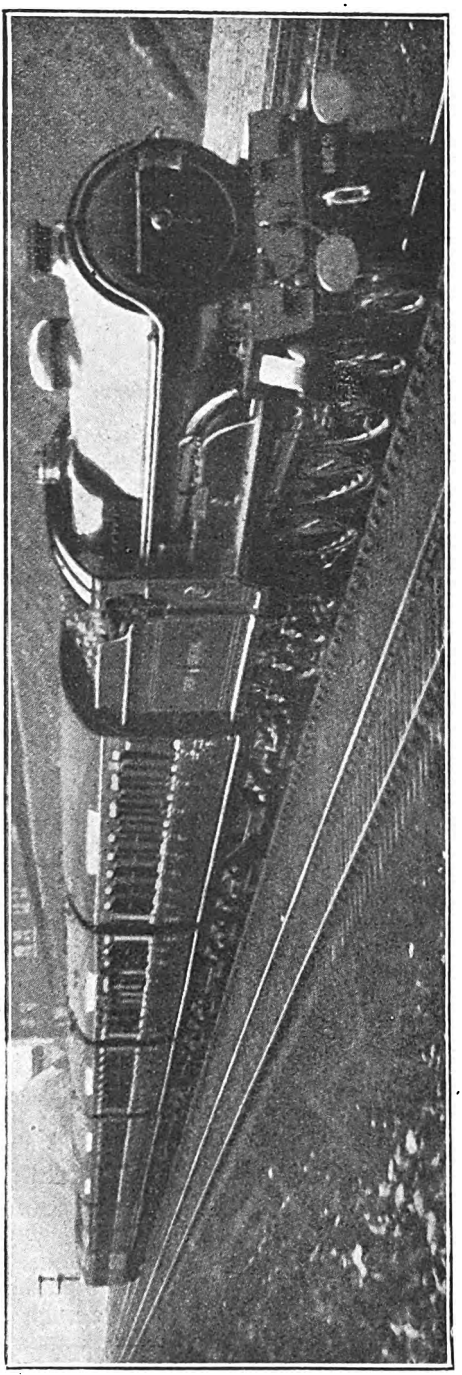

Photo.] GREAT CENTRAL RAILWAY. [*Chas. S. Lake.*

Four-cylinder Express Locomotive, No. 1169, *Lord Faringdon*, on the 2.15 p.m. Manchester–London Restaurant Car Express.

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levy has been made in recognition of their speed will obviously be exact punctuality of operation. I believe I am right in saying that travellers in pre-war days by the trains of this character in the United States had a right to demand a refund of a dollar for every hour that the train was late on arrival at destination. As this arrangement rendered possible a substantial loss to the companies concerned, they on their part took good care, first, to see that the schedule times were practical and, second, to use every precaution to ensure their minute observance. Now in order that punctuality may be observed it is essential, as we saw in the discussion on time-tables in my December article, that a reasonable margin shall be allowed over and above the tractive possibilities of the locomotives, to permit of recovery from at least one or two moderate delays experienced *en route*, some of which are unavoidable, even on the best regulated of systems. The necessity for such a margin does not appear to be recognised by some of our leading speed publicists.

Lord Monkswell, for example, has dealt at some length with the subject in his book "The Railways of Great Britain," and I will take the liberty of quoting a passage therefrom *in extenso*. "Let us take the case of a train weighing 200 tons (without engine and tender)," he writes, "running from Euston to Edinburgh with two stops—at Crewe and Carlisle—and drawn by engines capable of developing 1,500 h.p. continuously. The weight of the engine may be put at 75 tons and that of the tender (fitted with a water pick-up arrangement) at 35 tons when full, and 25 at the end of the run. The weight of the complete train will thus average a little over 300 tons. The power required to move a given train at a given speed varies to some extent according to circumstances—the state of the permanent way, the direction and force of the wind, &c., but, under ordinarily favourable conditions, such as obtain six days a week, an engine exerting 1,500 h.p. on a level line should maintain a speed of not less than 78 m.p.h. with a gross load of just over 300 tons. This corresponds to a resistance of 24 lbs. per ton of train at this speed. Such an average speed would be maintained on a perfectly level road, but the undulating character of all actually existing lines would reduce the average speed to a greater

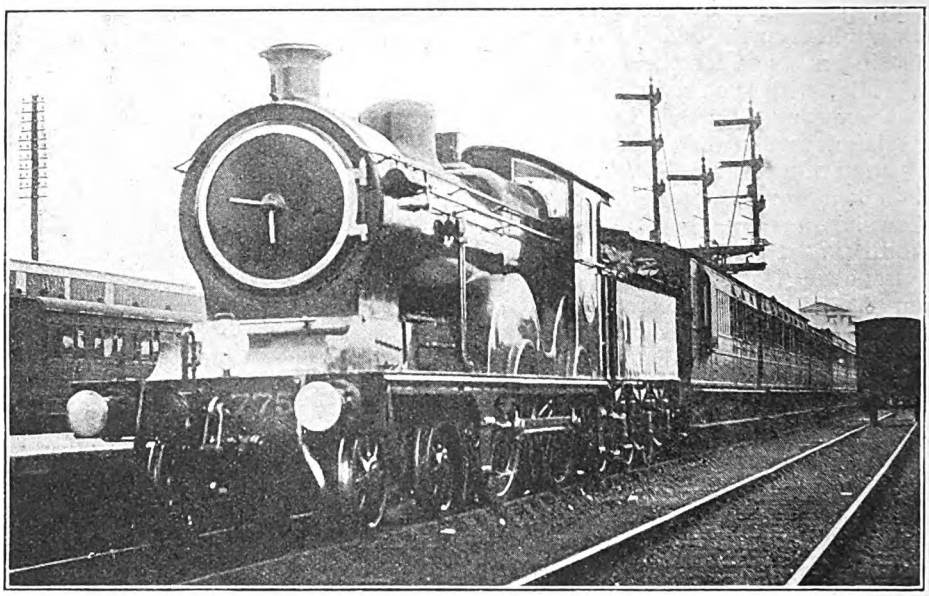

Photo.] GREAT EASTERN RAILWAY. [*J. Macartney Robbins.*

4-4-0 Superheated Locomotive, No. 775, on up stopping train at Cambridge.

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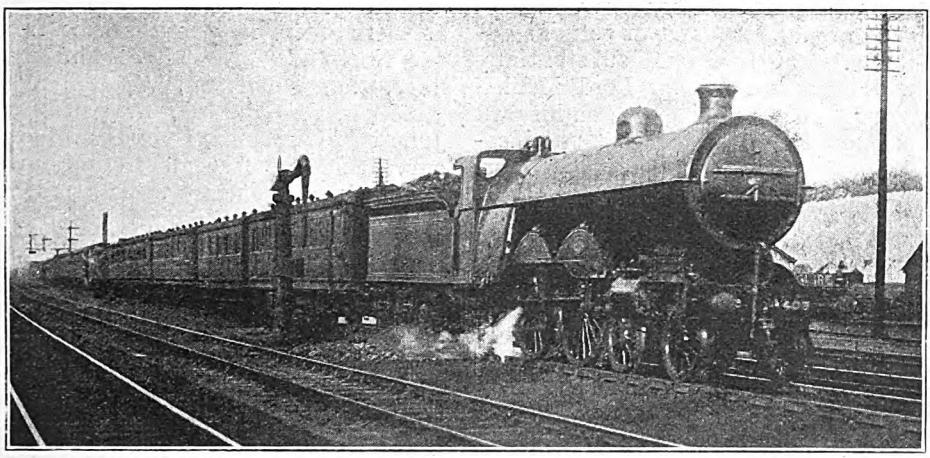

Photo]. GREAT NORTHERN RAILWAY. [*Chas. S. Lake.*

Up Express passing Hitchin. Non-superheater "Atlantic" Type Engine, No. 1408.

or less extent, according to the severity or otherwise of the undulations.

"Between Euston and Crewe the undulations are very gentle, and a reduction of 2 m.p.h. would be a sufficient allowance, while between Crewe and Edinburgh the severity of the gradients would probably cause a diminution of 5 m.p.h. Between Euston and Crewe, therefore, the average speed, so long as the engine was working at her full power, would be 76 m.p.h., and, for the remaining length, 73 m.p.h. There are also to be taken into account the delays due to starting and stopping, and those due to the necessity of slackening speed at certain curves and junctions—say 4 min. on each section for starting and stopping, and 3 min. each passing Rugby, Stafford and Strawfrank Junction, Carstairs, and 5 min. passing Preston, at each of which points a serious reduction of speed is necessary. This would leave the running time for the 158 miles between Euston and Crewe, 2 hours 15 min.; for the 141 miles between Crewe and Carlisle, 2 hours 5 min.; and for the 100¾ miles between Carlisle and Edinburgh, 1 hour 30 min. So, with 5-minutes' stops at Crewe and Carlisle, the running time from Euston to Edinburgh would be 6 hours. If anyone should really doubt the ability of a properly designed engine, weighing 75 tons, to go on developing 1,500 h.p. for the necessary periods of time, I can only ask him to go over to France, and carefully observe the work of some of the express engines on the Nord. I have, on several occasions, seen the 4-4-2 express engines of this line, which weigh only 63 to 65 tons, go for 10 or 12 miles together, doing work which, calculated according to the generally accepted tables, amounted to 1,500 h.p., and this without the boilers running short of steam or water, so that there was no apparent reason why they should not, if necessary, continue indefinitely to work as hard as this."

Lord Monkswell then proceeds to detail some of his experiences behind the 4-4-2 and 4-6-2 Nord compounds, to which I made some extended reference in the discussions on compounding which took place in these columns during 1917. Remarkable experiences indeed they were, and probably superior, in proportion to the size and nominal tractive power of the locomotives concerned, to anything yet recorded in this country. But the main point to note, it seems to me, is this. Fully cognizant of the tractive power of their engines, and progressive though they were to the extent of being, as they could undoubtedly claim, the fastest line in Europe, the Nord authorities yet did not exceed a maximum scheduled speed in their time-tables of 61.8 m.p.h.—from Paris to St. Quentin, 95¾ miles, in 93 min. Most of their crack trains on both the Calais and the North main lines, on which Lord Monkswell's performances were

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timed, maintained an overall average of about 60 m.p.h., exclusive of actual stopping time. This is a figure substantially below that advocated by Lord Monkswell, even though the engines, on his own admission, conform to his "specification" in the matter of tractive power. Why so? Because, as already explained, there must be a reasonable margin for practical working over and above the maximum tractive capacity of the engines.

As regards the locomotives themselves, he has reckoned the output of 1,500 h.p. continuously throughout the journey, basing the possibility on observations which have only extended to 10 or 12 miles of running under such conditions, during which he was on the footplate, and the driver therefore knew that his work was being recorded in detail. From such experiences to work of the same unvarying quality, hour after hour, day in and day out, is a very far cry. Lord Monkswell has assumed ordinarily favourable conditions of weather six days a week, which to my mind, in consideration of our English climate—consider, for example, the last three months or so!—is an unwarrantable basis of calculation. Further, he appears to have omitted to take into account general alignment considerations, as there are many points on the London and North Western and Caledonian main lines, *e.g.*, Wolverton, Weedon, Weaver Junction, Warrington, Wigan, Euxton Junction, Lancaster, Penrith, and various curves on the descents from Shap and Beattock summits which, although negotiable without danger at 50 or 60 m.p.h., are another proposition altogether at 80 or so. And the meagre margin over the 78 m.p.h. average allowed in respect of such climbs as Carnforth-Shap, and Gretna-Beattock Summit, certainly could not be whittled down to compensate for loss of time at the various points last mentioned. Finally, what about special speed restrictions, due to permanent way or other engineering operations, occasional signal checks, and other delays? Loss of time so caused could be regained to a reasonable extent on a booking of average celerity, but it would become a serious proposition on a schedule averaging over 70 m.p.h. throughout, with an engine working continuously at its full capacity. However, like the writer of the serial story, I must hold my own detailed suggestions over until "our next," or performance will be crowded out altogether.

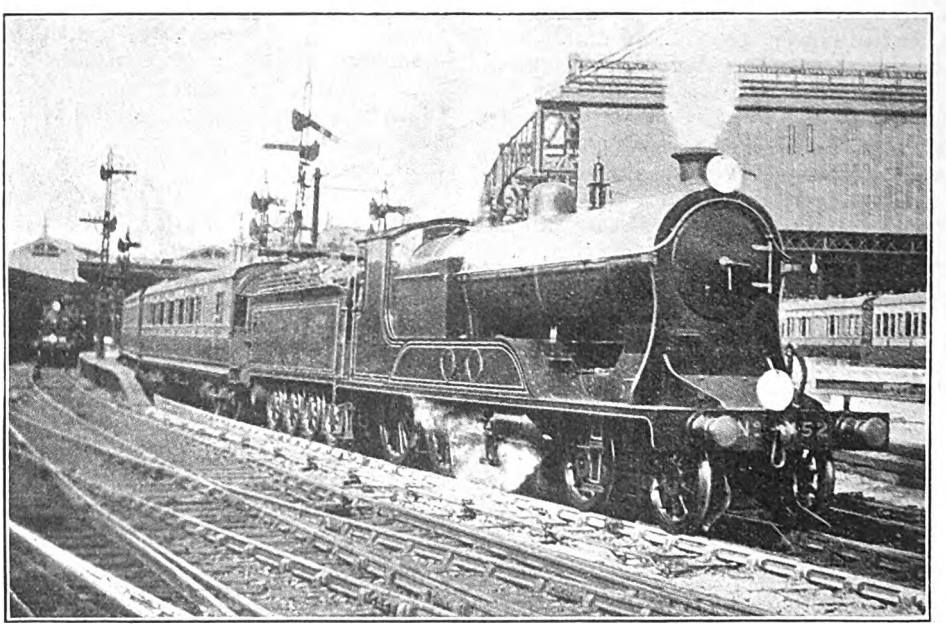

Photo.] LONDON & SOUTH-WESTERN RAILWAY. [*H. C. Doyne.*

Exeter and Plymouth Express leaving Waterloo. Four-cylinder 4-6-0 Locomotive, No. 452.

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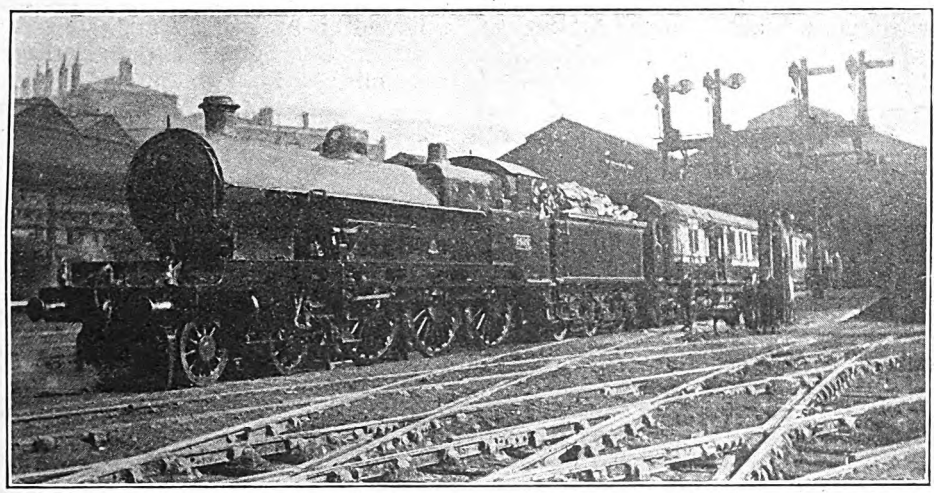

Photo.] [*J. Macartney Robbins.*

LONDON & NORTH-WESTERN RAILWAY.

4-6-0 "Claughton" Engine, No. 2426, on 1.0 p.m. Scotch Express at Euston, No. 6 Platform.

It needs a particularly wild stretch of the imagination at the present moment to look forward in the future to 200-ton or 250-ton expresses, when the gross loads of various of the East Coast trains by which I have travelled recently have totalled well over three times the former figure, far exceeding all my previous records. For example, the 6.25 p.m. express from York to Newcastle on the North Eastern Railway, comprising the Newcastle portion of the 1.30 p.m. *ex*-King's Cross, the stock employed on the 8.45 a.m. *ex*-King's Cross, and additional vehicles as required, has loaded on six successive occasions on which I have observed the train to 72, 83, 80, 67, 60 and 82 axles, 491, 552, 528, 451, 413 and 552 tare tons respectively. A very careful estimate of gross tonnage, compiled in every case from an exact counting of seats and a reckoning of passengers at 16 to the ton (there has been no difficulty in getting at the number of passengers travelling, as extra vehicles were attached at York in almost every case immediately before starting time, thus proving that practically every seat in the remainder of the train was occupied) gave the gross loads as 560, 615, 600, 510, 465, and 625 tons. The engine was invariably an unpiloted three-cylinder "Atlantic" of class Z, and time was always lost. From the beginning of the New Year, however, this train has been duplicated daily, as in pre-war times. Some tremendous loads have also been worked on the 9.38 p.m. *ex*-York (5.30 p.m. from London), amounting on six evenings to 67, 63, 60, 77, 63, and 58 axles, 435, 424, 411, 505, 422, and 378 tons net, and 485, 470, 455, 575, 479, and 425 tons gross, as nearly as I could estimate. I am quite at a loss to understand why the North Eastern Company should retain such a booking as 32 min. from York to Northallerton, 30 miles, by this train, and other proportionately difficult times north of this point, as not the slightest attempt is made by drivers to observe them, even if it could be done. In fact, it is a serious defect of the present North Eastern timetables that an insufficient increase has been made in journey times to meet present conditions, with the result that all trains, main and branch alike, are invariably behind time. The unfortunate result of conditions such as these is that drivers get in the way of dropping a certain number of minutes irrespective of variations in their load, the loss of time, for example, on the 6.25 p.m. between York and Darlington being almost exactly the same in every case but the last, despite a variation in the gross load from 465 to 615 tons.

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But let me briefly describe one or two runs which I was able to make on three of the occasions of most substantial loading. First of all, No. 2195, 4-4-2, had a train of 18 eight-wheelers, mixed corridor and non-corridor stock, 491 tons empty and 560 tons full. The night was wet, and bad weather proves a serious handicap to "Atlantics" in starting such colossal loads over the sharply-curved initial mile out of York, where slipping is almost inevitable. So we took 11 min. 35 sec. to get through Beningbrough, 5.5 miles; 18 min. 25 sec. to Alne, 11.2 miles; 24 min. to Pilmoor, 16.1 miles; 30 min. 40 sec. to Thursk, 22.2 miles; and 40 min. 20 sec. to Northallerton stop, 30 miles, in place of the 38 min. allowed. Speed rose to 53 m.p.h. at Alne, continued about that figure to Pilmoor, and on the all but level stretch thence to Thirsk (prior to which the road is faintly against the engine) to 55½ m.p.h.; on the 1 in 626 through Otterington we had fallen to 52 m.p.h. before shutting off steam. At Northallerton we stopped 5 min. instead of the meagre allowance of 2 min., and followed on by losing 1 min. 50 sec. on the 19 min. schedule thence to Darlington, 14.1 miles, taking 7 min. 20 sec. to pass Danby Wiske, 3.7 miles, and 13 min. 40 sec. to Eryholme, 8.9 miles. This was not so bad, but the work as a whole fell considerably below that of No. 732 with 550 tons, recorded in the October issue of last year.

On the next occasion No. 2197 had the modest total of 20 eight-wheelers, 528 tons empty and 600 tons full, and started rather well, passing Beningbrough in 11 min. 25 sec., Alne in 18 min., and Pilmoor in 23½ min., with a maximum of 55½ m.p.h. at Alne. But then the work sensibly fell off, as we dropped to 52½ m.p.h. beyond Pilmoor, and only reached 54 m.p.h. at Thirsk, passing the latter town in 30 min. 25 sec., and arriving at Northallerton in 40½ min., or 10 sec. more than before. On the second stage we did rather poorly, taking 7 min. 40 sec. to Danby, 14½ min. to Eryholme, and 21 min. 35 sec. to Northallerton. Aggregate loss of time to

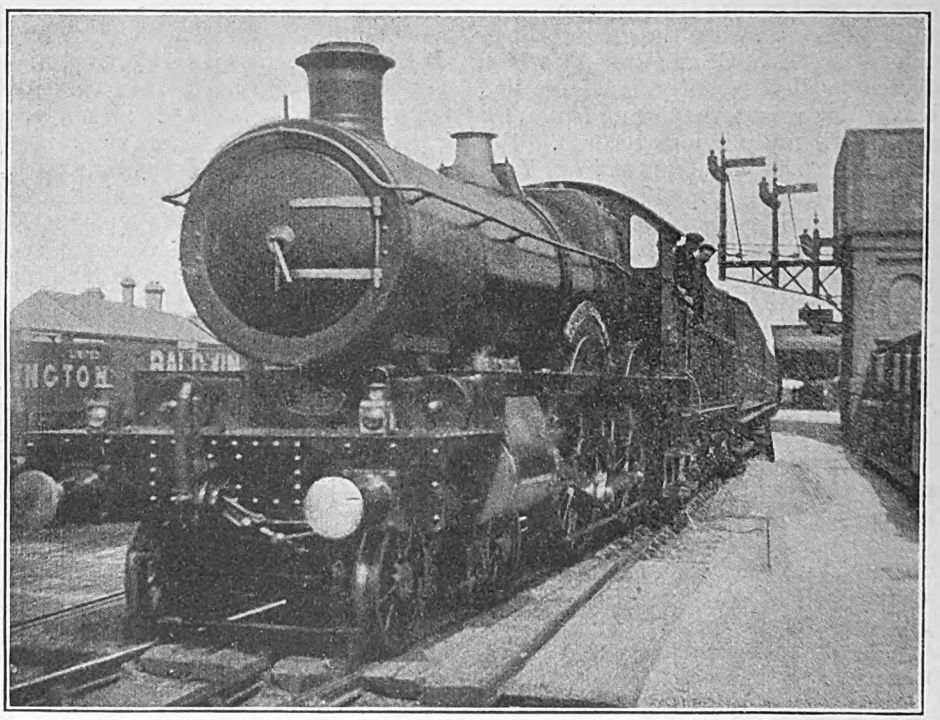

Photo.] GREAT WESTERN RAILWAY. [*A. Richardson.*

Oxford-Paddington Express Train. 4-4-0 Locomotive, No. 3839, *County of Pembroke.*

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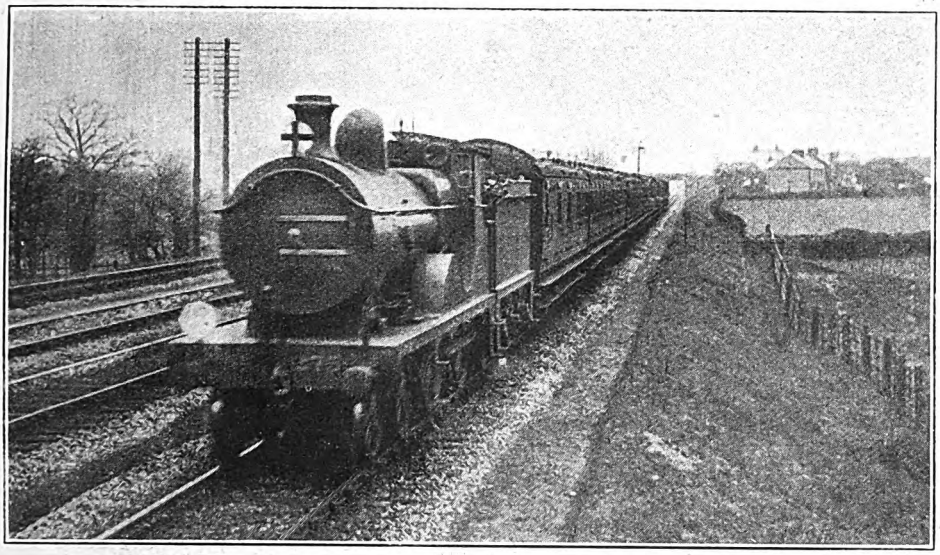

Photo.] SOUTH-EASTERN & CHATHAM RAILWAY. [*P. S. A. Berridge.*

Up Main Line Train near Orpington. 4-4-0 Locomotive, No. 275.

engine was therefore 5 min. On the third run, with an "Atlantic" of Class Z, whose number I did not catch, and 20 bogie vehicles, one of which was a Gresley "twin" on 12 wheels, totalling 82 axles, 552 tons empty and 630 tons full, the pace was funereal in the extreme, although the rails were certainly very greasy. We took 11 min. 40 sec. to Beningbrough, 19 min. 5 sec. to Alne, where we did not succeed even in touching 50 m.p.h.; 25¼ min. to Pilmoor; 32 min. 55 sec. to Thirsk (here we just achieved 50 m.p.h. !), and 43 min. 5 sec., to Northallerton. Thence a faint improvement took place, as we got through Danby in 7½ min.—a very fair start this for 3.7 miles, with a 630-ton load—Eryholme in 14 min. 20 sec., and reached Darlington in 21 min. 20 sec., running in rather faster than usual.

The best journey I had was one on the 9.38 p.m. out of York, when No. 2165 had to tackle a 63-axle train, 424 tons empty and 470 tons full. We passed Beningbrough in 9 min. 25 sec., at 55 m.p.h.; Alne in 15 min. 25 sec., at 61; Pilmoor in 20 min. 25 sec., at 58½; Thirsk in 26 min. 40 sec., at 61 again; and, only falling to 58½ before shutting off steam, reached Northallerton in 35½ min. exactly. This was a by no means discreditable piece of work, while the continuation was even better, as we passed Danby in 6 min. 55 sec., at 53 m.p.h.; fell to 50½ at Eryholme, which was passed in 13 min., and reached Darlington in the excellent time of 19 min. 25 sec., a loss of less than 1½ min. on the impossibly tight 18 min. allowance. By curtailing the Northallerton stop from the 2 min. allowed to 1¼ min., we therefore completed the journey from York to Darlington 75 sec. stop included, in 56 min. 10 sec., losing only a little over 4 min. in all on these "counsel of perfection" timings.

In the opposite direction the only running I recorded was exceptionally poor. On the up day *Scotsman* No. 733, class Z, 4-4-2, had succeeded in dropping 20 min. between Newcastle and Darlington with a load of 19 vehicles, two of them 12-wheelers, and the majority heavy corridor stock, weighing 554 tons empty and 615 tons full. So at Darlington a superheater 4-4-0 of class R was added as pilot, and one might then have expected at least some time to be regained on the easy allowance of 55 min. from Darlington to York. Not so, however. We took 8 min. 40 sec. to Eryholme, 5.2 miles; 19 min. 20 sec. to Northallerton, 14.1 min. (where the speed had actually fallen to 49 m.p.h.); 28 min. to Thirsk, 21.9 miles; 47 min. 20 sec. to Beningbrough, 38.6 miles; and

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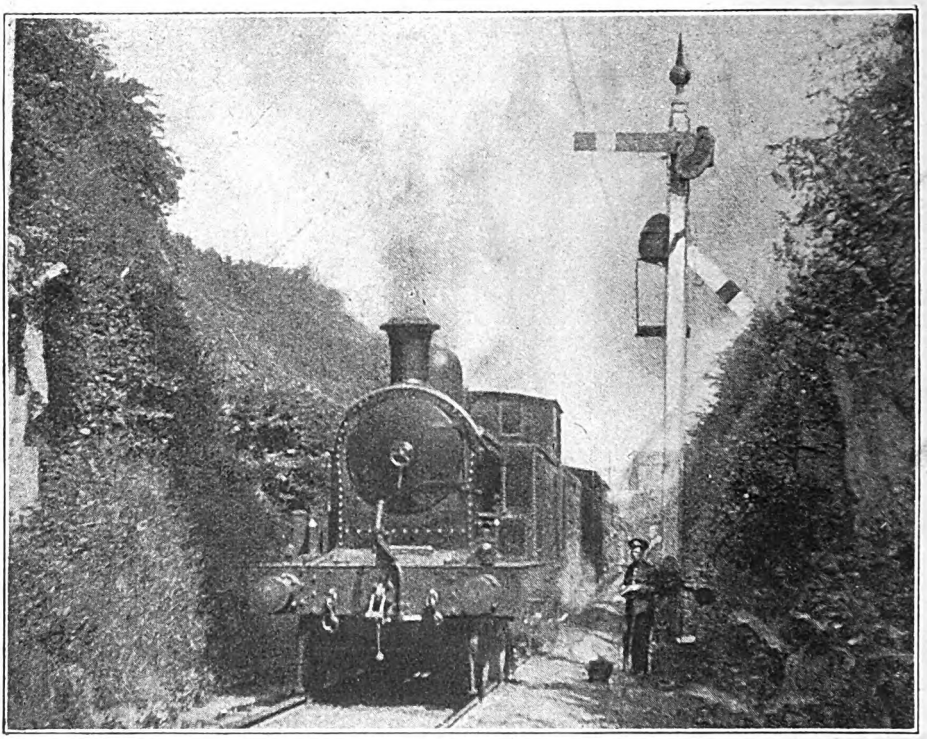

Photo.] CORK, BANDON & SOUTH COAST RAILWAY. [*K. A. C. R. Nunn.*

Cork-Baltimore Goods Train near Cork. Large 4-6-0 Tank Engine, No. 14.

55 min. 20 sec. to York, 44.1 miles—*i.e.*, 20 sec. excess over schedule. Similarly on the 8.48 a.m., No. 2200, with 52 axles, 357 tons tare and 395 tons gross, dropped 3 min. 50 sec. on the 17 min. allowance to Northallerton (stop)—a miserable exhibition—and then just contrived to run the 30 miles to York in 34 min. 10 sec., as scheduled, arriving 12 min. late. Lastly, No. 2199, on the first portion of the up mail, although running several minutes behind time, took 19 min. 10 sec. to Northallerton, and 35 min. 20 sec. thence to York, 10 and 20 sec. respectively over schedule, and this with the comparatively light load of 261 tons, or 280 tons all told. One could not have better examples of the traditional driving to which I have referred, and, incidentally, the late running of many of the up East Coast expresses over the Great Northern main line is hereby explained.

For on the Great Northern Railway, although the times have certainly been expanded in ample fashion, the running, apart from signal delays, is generally well within schedule and the locomotive work unexceptionable, even under the most onerous conditions of loading. Let me first describe, as examples, one or two runs on the 1.30 p.m. from King's Cross to Doncaster. My first journey was on a Saturday, the train being made up by successive additions to 18 bogie vehicles (one a new Gresley "twin" corridor coach) 74 axles, 506 tons empty and 575 tons full. The latter figure I arrived at after a very careful reckoning of seating accommodation, and of passengers standing in corridors, and I believe it to be accurate. No. 1407, superheater "Atlantic," had the services of rebuilt 4-4-0 No. 1314 as pilot up to Potter's Bar, and we compassed this 12.7 miles in 22 min. 40 sec., passing Finsbury Park, 2.5 miles, in 8 min. 5 sec. From Potter's Bar No. 1407, after a stop of 110 sec., did magnificently. We passed Hatfield, 5 miles, in 8 min. 25 sec., at

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61 m.p.h., fell to 41 at Woolmer Green were through Knebworth, 12.3 miles, in 11¼ min., and breasted Hitchin, 19.2 miles, in 24½ min. Speed rose to a sustained 75 m.p.h. before Arlesey, remained at 69 through Biggleswade, 64 at Sandy, and 62½ at Tempsford, and fell to 52½ at St. Neot's, after which we very appreciably eased down. But we had got through Sandy, 31.4 miles, in 35 min. 5 sec., and St. Neot's, 39 miles, in 42¾ min.; Huntingdon, 46.7 miles, was passed in 50 min. 40 sec. After that we fell to 28 m.p.h. on the 1 in 200 of Stukeley bank and only touched 62½ at Holme, so that the last 17.5 miles into Peterborough took 23 min. 20 sec., but even so we arrived 4½ min. early, having taken 98½ min. from London. The 63.7 miles from Potter's Bar had occupied 74 min. precisely, and could easily have been covered in 2 or 3 min. less. At Peterborough on this journey I alighted.

The next run was one with a reduced load of 70 axles, 483 tons empty, and 545 tons full, and the engines out of the terminus were No. 1416, superheater 4-4-2, and No 1346, 4-4-0, the latter coming off at Potter's Bar as before. We made a very smart start, passing Finsbury Park in 6¾ min., and reaching Potter's Bar in 22 min. exactly, where a halt of 70 sec. was made. Re-starting, the driver of No. 1416 spun out his time rather more evenly, and the running was not so notable. We passed Hatfield in 8 min. 35 sec., at 62½ m.p.h., Knebworth in 17 min. 10 sec. (having fallen to 44 m.p.h. at Woolmer Green), Hitchin in 24 min. 25 sec., Sandy in 36 min. 50 sec., and Huntingdon in 54 min. 55 sec., but the final stage was covered in 21¾ min., in virtue of a good minimum of 33 m.p.h. on Stukeley bank, and a maximum of 65 beyond. The top speed at Arlesey was only 67 m.p.h. On this journey, therefore, Peterborough was reached in 99 min. 50 sec. from London, again over 3 min. early, and in 76 min. 40 sec. from Potter's Bar. On the third occasion, although the prospects of a colossal load were excellent, I was baulked by a last-minute division of the train, and as on the second portion No. 294 (superheater) had only 58 axles, or 430 tons all told, little effort was needed. We passed Finsbury Park in 8 min. 20 sec., Potter's Bar in 26 min. 40 sec., Hatfield in 32 min. 50 sec., Hitchin in 49 min., and were severely checked by signal near Sandy. Nevertheless, we got through Huntingdon in 81 min, 5 sec., and reached Peterborough in 102 min, 25 sec., just inside schedule, or 99 min. net.

Continuing northward the two journeys last-mentioned, our engines were No. 1406 and an unknown "Atlantic," both superheated, respectively, but the main interest

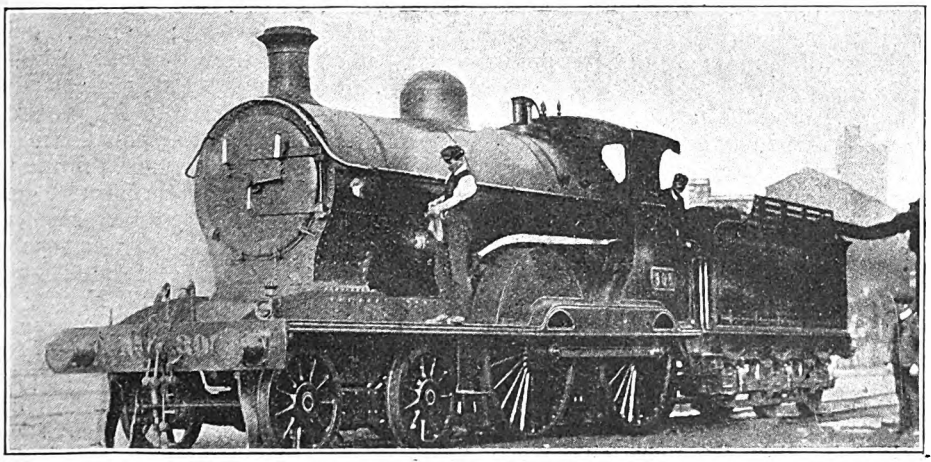

Photo.] GREAT SOUTHERN & WESTERN RAILWAY. [*J. Macartney Robbins.*

4-4-0 Rebuilt Engine No. 305, outside shed at Inchicore.

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was, of course, on the first journey, a load of 545 tons being a good deal more exciting than a beggarly 430! On both occasions we were "pushed" out of Peterborough (this arrangement being, I believe, to prevent the possibility of any train setting back on the slight incline through the station over the catch-points at the south end), and passed Werrington, 3.1 miles, in 7 min. 15 and 10 sec.; Essendine, 12.2 miles, in 18½ min. and 17 min. 40 sec.; and Stoke Summit, 23.7 miles, in 37 min. 25 sec. on both runs (at exactly 30 m.p.h. after the three culminating miles at 1 in 178 on the first, and as a result of a p.w.r. check near Corby on the second run). After that timekeeping was simplicity itself, but on both journeys some fast running ensued to Newark, the 5.4 miles from Stoke to Grantham taking 6 min. 10 and 25 sec., and the 14.6 miles thence to Newark 14½ min. exactly, both times. Thence up to Markham, 13.6 miles, took 18 min. 35 sec., and 19 min. (minima were 33 and 27 m.p.h. respectively), and on to Retford, 4.9 miles, 6 min. 10 sec. and 6½ min.; while the Retford-Bawtry length of 9.1 miles took 10 min. 5 sec. and 9 min. 55 sec.; and the concluding 8.3 miles into Doncaster 11¼ min. and 11 min. 20 sec. So our overall times from Peterborough, 79.6 miles, were 104 min. 10 sec. and 105 min. 5 sec., against 108 min. scheduled, again well on the right side of time-table requirements. On the second run, also, the net time was 103 min., and doubtless more time would have been gained but for the driver's fear of running into the signals of the first portion.

In the reverse direction I will content myself with describing one run only, that being the continuation to London of the journey with the up day "Scotsman" commenced at Darlington. At York we shed one coach, and continued with 17 in all, 76 axles, 529 tons empty and 590 tons full, behind No. 282, a newly superheated "Atlantic." We passed Escrick, 7.1 miles, in 13 min 5 sec.; Selby, 13.8 miles, in 21 min. 35 sec. (reducing speed to 37 m.p.h.); and Balne, 22.2 miles, in 33 min, 40 sec., but adverse signals at Shaftholme Junction compelled a dead stop after a long preliminary slowing, this 28 miles having taken 42 min. 35 sec. Unfortunately this was the first of three similar delays, the second stop being beyond Newark, and the third before Grantham, from each of which the engine restarted with the greatest difficulty on slippery rails, and the consequent loss of time was very serious. From our work over unobstructed stretches, as Doncaster to Retford, 17.4 miles, in 22 min. 50 sec., and Retford over Markham Summit to Newark, 18.5 miles, in 23¾ min., I estimate we should have kept time, the minima of 28½ m.p.h. at Markham, and, subsequently, of 31 at Peascliffe Tunnel, being quite good. But, in point of fact, instead of 114 min. from York to Grantham 82.7 miles, we took 150 min, 5 sec.!

At Grantham No. 1404, superheated, came on, and had a hard struggle to get up to Stoke (why not the obvious remedy of banking in rear in such cases?), taking 16¼ min. for the 5.4 miles. On the descent to Essendine, however, we touched 71½ m.p.h. at Bytham, and maintained 69 beyond, the 18.2 miles from Stoke to Helpston taking 18 min. 35 sec., but a bad signal delay outside Peterborough, due to the 5.30 p.m. *ex*-King's Cross crossing our path, made us take 44 min. to pass the latter town, 20 miles. Thence we took 26¾ min. to Huntingdon, 17.5 miles; 17½ min. on to Sandy, 14.8 miles; 17 min. 50 sec. from Sandy to Hitchin, 12.2 miles, and 12 min. 50 sec. for the further 6.9 miles up to Knebworth; 8 min. 40 sec. from Knebworth to Hatfield, 7.3 miles; 6½ min. on to Potter's Bar, 5 miles; and 14 min. 55 sec. thence into King's Cross, 12.7 miles. So our total time from Grantham was 1 min. under 2½ hours, or 4 min. over schedule, of which the Peterborough delay accounted for 2 or even 3 min. Net time from Peterborough to London was 105 min. As regards speeds the minima were 28 m.p.h. at Ripton, 45 at St. Neots, and 27 at Stevenage, while the maxima were 60 at Huntingdon, 64 at Hatfield, and 69 at New Southgate. For a load of nearly 600 tons, therefore, the driver of No. 1404 had no cause to be ashamed of his work.

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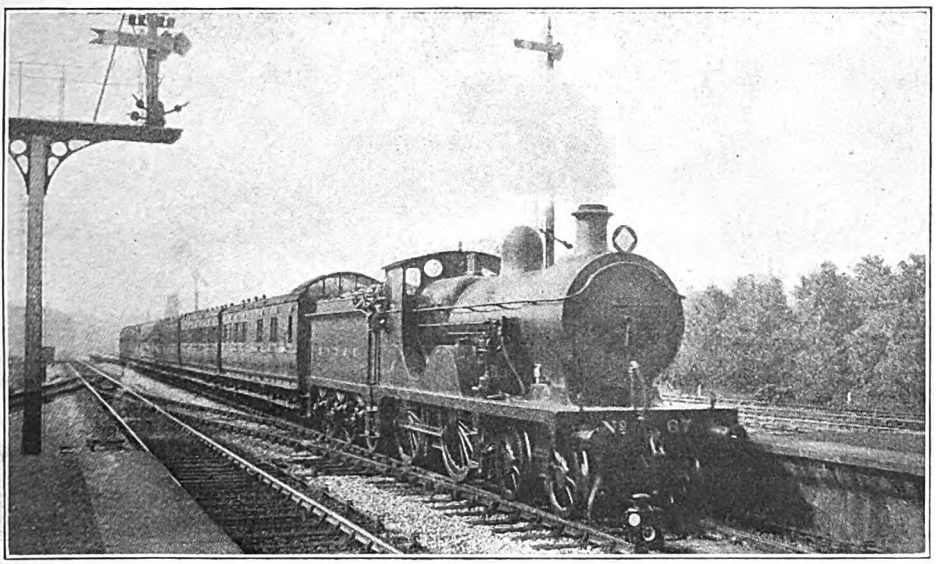
War and the Railways—British Express Train Services in 1918.

By VOYAGEUR.

NOW that the tide of the War has at last turned, and the bonds of military restrictions are one by one being loosed, the time has come to review the lowest ebb to which British express train services have descended as a result of the world-shaking events of the past four years. Before the War the express trains running over all the main lines of this country were without doubt unrivalled the world over for their frequency, their high average speed, generally speaking, and for their uniform luxury of accommodation, provided alike for third and first class passengers without supplementary charge, save in certain rare exceptions. At the conclusion of the War the travelling facilities of this country, mercilessly decelerated and cut down though they have been, still remain considerably superior in all respects to those of all other of the belligerent countries, except the United States, which came into the War last of all, and has not been denuded of men to anything like the same extent as the other warring nations.

The enormous disadvantages under which British railway companies have laboured during the latter part of the War are perhaps insufficiently realised. In the first place some 30 per cent of the total railway staffs have been enlisted, their places being filled as far as possible by women, who, of course, have required to be trained in their new duties. In addition to this some 600 locomotives have been loaned to the Government and sent overseas on war service, together with large quantities of rolling stock. Further, the shortage of men and materials and the crying need for munitions have made it impossible either to build new locomotives and rolling stock in quantities in anyway comparing with the standards



Photo] [*E. A. Gurney-Smith.*

SOUTH EASTERN & CHATHAM RAILWAY.
Down Express passing Chislehurst.

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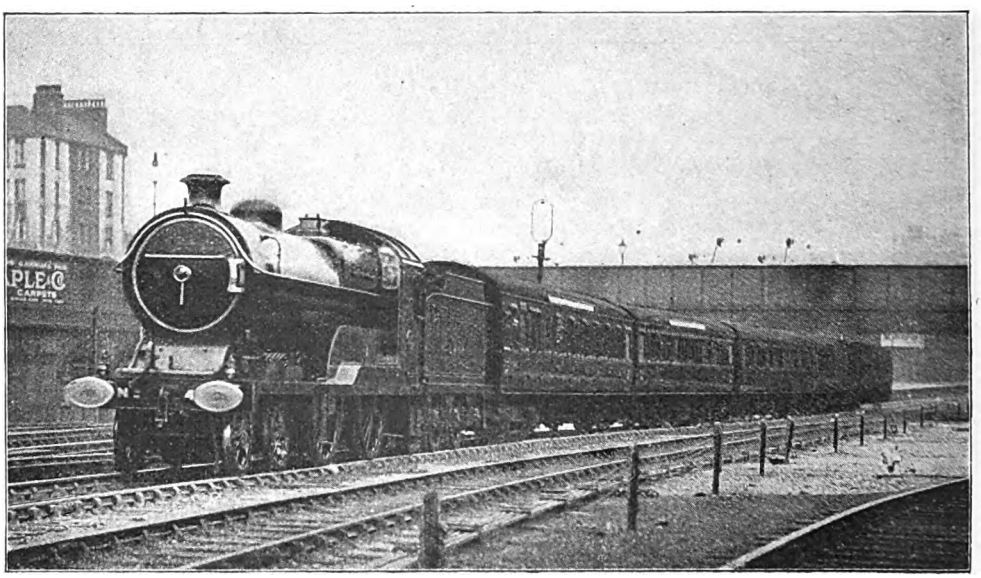
of construction in peace-time, or even to keep the maintenance of the existing plant at its proper level. Yet, despite this serious shortage of stock, the quantity of passengers and goods to be conveyed in the latter years of the War has exceeded every record in British railway history. In circumstances constituting so extraordinary a handicap as these, we as a nation are entitled to congratulate ourselves on the travel conditions of to-day in these islands, and are at the same time under no small obligation to those who have maintained our train services at so comparatively high a level, with a minimum



Photo] GREAT CENTRAL RAILWAY. [*F. E. Mackay*,

3.15 p.m. Express leaving Marylebone.

of accident and, generally speaking, a very considerable degree of punctuality.

It is interesting to compare the speed of travel in this country immediately before the War with that which obtained at the end of 1918, and for this purpose I have prepared three tables, incorporating in a condensed form the familiar annual *résumés* found in the *Railway Year Book* until war conditions caused them for a time to be cut out. The first of these tables shows the quickest time of transit between London and the principal towns in England and Scotland in July, 1914, as compared with October, 1918, together with the percentage of increase during this period. From this table it will be noted that, taking the average of all journeys, short and long, travelling times have increased by an average of 22.4 per cent., that is to say, an addition of approximately 14 min. to each hour spent in the train. Taking the figures of the most representative companies as regards journeys in England, the Great Central Railway heads the list with an average increase of only 8 per cent., followed by the Great Western Railway (18 per cent.), Great Northern Railway (28 per cent.), London and South Western Railway (25 per cent.), London and North Western Railway (27 per cent.), and the Midland Railway (33 per cent.). To places in Scotland the average increase in journey time is about 22 per cent. by each of the three routes. These additions to the fastest times are, of course, more or less proportionate to the all-round increases that have taken place in the schedules of expresses generally.

The second table is one showing the fastest individual run made by each company when at the lowest level of its speed achievements. Considerations of space forbid me to reproduce in full the pre-

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DISTANCES and Fastest Times between London and Provincial Towns in 1914 and 1918.

Town.	Distance.	1918 Fastest Time.	Direction.	Route.	1914 Fastest Time.	Increase 1918 over 1914.	
	miles.	h. m.			h. m.	h. m.	pr. ct.
Aberdeen ...	523½	13 30	Up ...	East Coast ...	11 5	2 25	22
Birmingham...	113	2 35	,, ...	L. & N.W.R. ...	2 0	0 35	29
,, ...	110½	2 30	Both	G.W.R.	2 0	0 30	25
Bournemouth	108	2 39	,,	L. & S.W.R. ...	2 0	0 39	33
Bradford ...	193¼	4 50	Down	G.N.R.	3 56	0 54	23
,, ...	208	5 55	,,	Mid. R.	4 13	1 42	40
,, ...	203½	5 0	Up ...	G.C & L. & Y.R.	4 42	0 18	6
Brighton ...	51	1 0	Both	L.B. & S.C.R. ...	1 15	0 15	25
Bristol ...	118½	2 15	Up ...	G.W.R.	2 0	0 15	13
Cardiff ...	145¼	3 10	,, ...	,, ...	2 50	0 20	12
Carlisle ...	299	6 45	,, ...	L. & N.W.R. ...	5 48	0 57	16
,, ...	308¾	7 28	Down	Mid. R.	6 5	1 23	23
Edinburgh ...	393	9 40	,,	East Coast ...	7 45	1 55	25
Exeter ...	171¾	3 57	,,	L. & S.W.R. ...	3 14	0 43	22
,, ...	173¾	3 30	Up ...	G.W.R.	3 0	0 30	17
Glasgow ...	401½	9 30	,, ...	West Coast ...	8 0	1 30	19
,, ...	424¼	10 40	Down	Mid. & G. & S.W.R.	8 45	1 55	22
Hull... ...	196¾	4 55	,,	G.N. & N.E.R. ...	3 52	1 3	27
Inverness ...	567¾	15 55	,,	West Coast ...	12 50	3 5	24
Leeds... ...	185¾	4 32	,,	G.N.R.	3 25	1 7	33
,, ...	196	4 47	,,	Mid. R.	3 40	1 7	30
Leicester ...	99	2 15	,,	,, ...	1 45	0 30	29
,, ...	103	1 56	,,	G.C.R.	1 49	0 7	6
Liverpool ...	192¼	4 45	Both	L. & N.W.R. ...	3 35	1 10	32
Manchester ...	188¾	4 35	Up ...	,, ...	3 30	1 5	31
,, ...	189½	5 8	Down	Mid. R.	3 40	1 28	40
,, ...	212	4 45	,,	G.C.R.	4 10	0 35	14
Newcastle ...	268½	5 55	,,	G.N. & N.E.R. ...	5 13	0 42	13
Norwich ...	115	2 54	,,	G.E.R.	2 26	0 28	19
Nottingham ...	123½	2 55	,,	Mid. R.	2 12	0 43	33
,, ...	126½	2 27	,,	G.C.R.	2 23	0 4	3
Perth ...	449¾	11 5	,,	West Coast ...	9 0	2 5	23
Plymouth (N. Rd.)	230¾	5 55	,,	L. & S.W.R. ...	4 55	1 0	20
,, ,,	225¾	5 0	Both	G.W.R.	4 7	0 53	21
Sheffield ...	158¼	4 1	Down	Mid. R.	3 0	1 1	34
,, ...	164¾	3 22	,,	G.C.R.	2 57	0 25	14
York	188	4 0	,,	G.N.R.	3 35	0 25	12

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war crack runs of the railways concerned, but these may be found in any issue of the *Railway Year Book* prior to 1915. For the sake of comparison, however, I have shown against the speed column the highest pre-war scheduled speed in each case. It will be noticed in this table that the railways generally preserve very much their pre-war order, with a drop in the speed of the fastest run of from about 5 to 8 miles per hour. In only one or two instances does the same train figure in the table as previously, but this is so in the case of the Great Western Railway 11 a.m. *ex*-Paddington, now non-stop to Bath (where a slip coach was detached prior to the war) instead of Bristol, the Great Northern Railway of Ireland, and the Manchester-Liverpool services of the Lancashire and Yorkshire Railway and the Cheshire Lines Committee. In these instances only is a direct comparison possible between present and pre-war speeds. The Great Northern Railway of Ireland is the only company in the British Isles that has earned the distinction of *accelerating* its services during the War period.

In the last table evidence is afforded of the havoc that has been worked among the remarkable collection of non-stop runs in this country exceeding 100 miles in length, by the withdrawal of many expresses owing to war conditions, and the insertion of compensating stops in the timings of those that remain. Thus the longest non-stop run is cut down from 225¾ miles (Paddington-Plymouth) to 158 miles (Euston-Crewe), and the total number of such runs from 185 to 29. The latter number might have been slightly increased by the inclusion of the 8.45 and 9 p.m. Scotch expresses from St. Pancras to Nottingham, Midland Railway, 123½ miles, and also the 2.30 a.m. from Carlisle to Stirling, Caledonian Railway, 117¾ miles, but in each of these cases intermediate stops are regularly made. Both the Midland trains make conditional, but regular, stops at Kettering, and the Caledonian train has a definite stop in the working time-tables at Motherwell, for the purpose of detaching two through vans for Glasgow, in addition to the customary stop at Beattock for banking assistance to Summit. The Midland Company has also four runs which only just escape inclusion in the table, *e.g.*, between London and Leicester, 99 miles.

Even more drastically pared have been the restaurant car services. Only six railways have continued to run restaurant cars on their trains—the Midland (and Glasgow and South Western in conjunction), Great Central, London and South Western, Great Eastern, and Great Northern of Ireland. The total number of Midland restaurant car trains has been reduced to 20 daily, against 64 in pre-war summer days, and 55 in winter. London and South Western totals have shrunk from 36 in summer and 26 winter to 12, Great Central from 22 and 20 to 8, and Great Eastern from 35 and 29 to 4. On the other hand, the Great Northern Railway of Ireland has increased its restaurant car services from 4 to 8 daily. All other lines having dropped out, the weekday total of restaurant car trains operated in this country has fallen from the remarkable gross figure of 404 in summer and 345 in winter, in pre-war days, to 54 at the end of the war period, 44 in England, 8 in Ireland and 2 in Scotland. Sleeping car services have, on the other hand, been maintained in a much larger proportion. principally for the benefit of naval officers and others travelling north on Government business.

With the withdrawal of restaurant cars a considerable quantity of corridor stock has also vanished, temporarily, on many lines, only the Midland, the Great Western, and the East and West Coast Companies (on their through services) retaining corridor coaches exclusively as heretofore. Non-corridor vehicles, of course, allow of a much larger complement of passengers being conveyed in proportion to the weight of the coaches, and in this way the difficulty of compressing an almost undiminished number of travellers into a very diminished service of trains has, as far as possible, been coped with. Discomfort there undoubtedly has been—in consideration of the circumstances outlined in the second paragraph it is both remarkable and commendable that the discomfort of travel has not been much greater—but we now look forward to the time, foreshadowed by the additions already made to the Great Eastern and North Eastern time-tables, and announced in many other directions shortly, when British travel will be restored, at least in some measure, to those conditions which made it world-famous before the War.

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FASTEST RUNS ON LEADING RAILWAYS IN 1914 AND 1918.

	In October, 1918.						¶ In 1914.
Railway.	Train.	From.	To.	Miles.	Minutes.	Speed miles per hour.	Speed miles per hour.
G.C.R.	7.43 p.m. ...	Woodford ...	Leicester ...	34	36	56.7	61.3
N.E.R.	9.38 p.m. ...	York	Northallerton ...	30	32	56.3	61.7
G.W.R.	11.0 a.m. ...	Paddington ...	Bath	107	118	54.4	59.2
L. & S.W.R. ...	9.21 a.m. ...	Dorchester ...	Wareham ...	15	17	52.9	57.2
G.E.R.	5.39 p.m. ...	Rayleigh ...	Prittlewell ...	$7\frac{3}{4}$	9	51.7	52.1
L. & N.W.R. ...	8.23 a.m. ...	Willesden ...	Rugby	77	91	50.8	57.7
G.N.R.	5.53 p.m. ...	Hitchin	Huntingdon ...	27	32	50.6	57.5
G.N.R. (I)	*7.25 a.m. ...	Dublin	Drogheda ...	$31\frac{3}{4}$	38	50.1	48.0
Cal. R.	†2.25 p.m. ...	Westcalder ...	Merchiston ...	$14\frac{3}{4}$	18	49.2	57.2
S.E. & C.R. ...	‡8.3 a.m. ...	Ashford ...	Paddock Wood	$21\frac{1}{4}$	26	49.0	54.8
L. & Y.R. ...	§Various ...	Liverpool ...	Manchester ...	$36\frac{1}{2}$	45	48.7	54.7
G.S. & W.R. (I) ...	5.37 p.m. ...	Maryborough ...	Dublin	51	63	48.6	51.9
Midland R. ...	9.25 a.m. ...	Mangotsfield ...	Gloucester ...	32	40	48.0	56.8
N.B.R.	§Various ...	Haymarket ...	Glasgow ...	$45\frac{3}{4}$	60	45.8	52.3
G. & S.W.R. ...	5.15 p.m. ...	Kilmarnock ...	Dumfries ...	$58\frac{1}{4}$	75	44.8	54.6
C.L.C.	§Various ...	Manchester ...	Warrington ...	$15\frac{1}{2}$	21	44.3	51.7
L.B. & S.C.R. ...	‡11.31 a.m. ...	East Croydon ...	Brighton ...	$40\frac{1}{4}$	56	43.1	51.0

* Also 6.17 p.m. up. † Also 5.11 p.m. ‡ Sundays only. § Also in opposite direction of running.

¶ Not necessarily between the same stations.

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NON-STOP RUNS IN OCTOBER, 1918, EXCEEDING 100 MILES.

Railway.	Runs between	Miles.	No. of runs.	Fastest time. Min.	Speed m.p.h.	Fastest train.	Total No. of Runs. 1918.	Total No. of Runs. 1914.
L. & N.W.R. ...	Euston and Crewe	158	2	194	47.8	8.20 p.m. D.		
	Crewe and Willesden	152½	2	183	50.0	3.55 a.m. U.		
	Carlisle and Crewe	141	2	189	44.7	1.25 a.m. U.	10	62
	Euston and Stafford	133½	1	170	47.1	4.45 p.m. D.		
	Crewe and Holyhead	105¾	2	134	47.4	2.30 a.m. U.		
	Wigan and Carlisle	105	1	142	44.4	11.57 p.m. D.		
G.W.R.	Taunton and Paddington ...	143	1	165	52.0	2.55 p.m. U.		
	Newport and Paddington ...	133½	3*	165	48.5	10.25 a.m. U.	6	37
	Bristol and Paddington ...	117½	1†	135	52.2	12.10 p.m. U.		
	Paddington and Bath... ...	107	1	118	54.4	11.0 a.m. D.		
G.N.R.	King's Cross and Grantham ...	105½	6	133	47.6	5.30 p.m. D.	6	29
N.E.R.	Newcastle-Edinburgh ...	124½	3‡	181	41.3	9.30 p.m. U.	3	13
G.C.R.	Marylebone-Leicester	103	2	116	53.3	3.15 p.m. D.	2	4
Caledonian R. ...	Carlisle-Glasgow	102½	2§	152	40.5	7.10 a.m. D.	2	8
Midland R. ...	—	—	—	—	—	—	Nil	23
G.E.R.	—	—	—	—	—	—	Nil	7
L. & S.W.R. ...	—	—	—	—	—	—	Nil	4
Total ...	—	—	—	—	—	—	29	185

* Includes conditional stops at Severn Tunnel Junction, and in one case at Badminton also.
† Two runs on Sundays.
‡ Includes conditional stop at Dunbar in one case.
§ The north-bound train usually stops at Beattock for banking assistance to summit, and the south-bound train has conditional stops at Motherwell and Carstairs.

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The Why and the Wherefore.

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-first annual edition of which is now out of print, but the new edition for 1919 is in preparation and it will be published in April next, price 5s. net, by post 5s. 6d. Every reader who desires a copy should order at once. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use.*

"Prince of Wales" 4-6-0 Class, London and North-Western Railway.

These engines are a superheated development of the preceding "Experiment" class, and have dimensions as follows:—Cylinders, 20½ in. diameter by 26 in. stroke; driving wheels, 6 ft. 3 in. diameter; heating surface, tubes, 1440 sq. ft., fire-box, 183 sq. ft., superheater, 325 sq. ft.—total, 1898 sq. ft.; grate area, 25 sq. ft.; working pressure, 175 lb. per sq. in.; weight in working order, 66¼ tons, of which 46¾ tons rank for adhesion. Tender, with 3,000 gallons of water and 6 tons of coal, 39¼ tons. None of the "Experiment" class engines have yet been equipped with superheaters, and for the *n*th time we must protest that we are not sufficiently gifted prophetically to foretell future developments. The "Prince of Wales" class numbers 90 locomotives and the "Experiment" class nominally 105, but actually 104, as No. 1361, *Prospero*, was in 1915 converted into a four-cylinder simple engine, with 14 in. by 26 in. cylinders, and superheated, in order that a trial might be made of the Dendy-Marshall arrangement of cylinders and valves. We have not space to give the desired list of London and North-Western Railway engine sheds.

[Reply to F. T. THOMAS and "FLYING FOX."]

60-ft. Rails.

It is quite probable that you have noticed 60 ft. rails in the main lines of the Great Western Railway, and you might notice them also at the present time on almost every large British system. This does not indicate a change of standard on the lines concerned, but it is due to the fact that, when all the British rolling mills were fully engaged on shell manufacture and other munitions of war, the few rails with which the various railway companies could be supplied were rolled by the London and North-Western Railway in their own rolling-mill plant at Crewe, 60 ft. being the London and North-Western standard length. Rail manufacturers generally, however, are very chary of accepting contracts for 60 ft. rails, owing to the difficulty of handling them, and the change, therefore, is unlikely to become permanent.

[Reply to Lieut. G. C. MONTGOMERY.]

Distance Points.

The letters "D.P." stand for "distance point." Such posts are placed at each station to indicate the point to which distance is measured, *i.e.*, the distance between two stations taken for the purpose of fixing rates and fares is the actual distance between distance posts at the respective stations. Formerly distances were taken to booking office doors, but now the posts are fixed midway between the extremes of the up and down platforms. Where the post is fixed outside of a station it represents the end of a branch. At centres such as York there is a "zero post," and it is from this post that the distances are measured for the whole district. For instance, the figure 40 on a milepost on the North-Eastern Railway main line indicates a distance of 40 miles from the "zero post" at York.

[Reply to "YELVERTONIAN."]

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Some Queries concerning Great Northern Railway Locomotives.

There is only one suburban passenger tank engine on this line fitted with superheating apparatus, viz., No. 1598, 0-6-2 type. The small "Atlantics" share duties with the large-boilered 4-4-2's, and, at the last information in our possession, were stationed as follows:—King's Cross, 252-3-4; Peterborough, 255-6-8-9, 949, 985-7-9, 990; Grantham, 257, 950, 982-6-8; Doncaster, 250, 260; York, 983-4. In addition to the superheated "Atlantics" mentioned in answer to K. A. Kindon in the January issue, we are informed that the following engines also now have been equipped with superheating apparatus:—Small-boilered type, 256-7; large-boilered type, 284-5-8, 294, 296, 1402, 1408, 1414, 1437, 1441, 1444.

[Reply to G. N. R. and K. A. KINDON.]

The Central London Extension.

It is impossible for us to prophesy as to whether the above extension to Ealing will be completed for traffic during 1919, but doubtless as soon as labour is available this and other half-completed railway projects will be pushed forward with all speed. We cannot agree as to an extension along the Uxbridge Road being preferable to the one now in course of construction. Such an extension would only benefit a comparatively small area, whereas a junction with the Great Western main line brings the whole of the Great Western suburban area into immediate touch with the West End and the City.

[Reply to R. D. J.]

Water Troughs.

Water troughs are obviously laid only on level stretches of line, but with this reservation their location is governed by three considerations:—(1) abundance and cheapness of water supply; (2) chemical suitability of water; (3) utility from the traffic standpoint. Troughs located near a starting-point or an important intermediate junction where the majority trains call are of considerable use, as they obviate the loss of time and occupation of roads caused by the standing of engines at water-columns for the purpose of taking water prior to starting.

[Reply to 2nd Lieut. A. R. COWLISHAW.]

The Highland Railway.

The line from Perth to Inverness is single with the exception of the undernoted sections, which are double, viz.:—

Perth to Stanley Junction 7¼ miles.
Blair Atholl to Dalwhinnie 23¼ ,,
Daviot to Inverness 11 ,,

The Perth-Stanley section is the property of the Caledonian Railway, and the Highland Railway exercises running powers over it. The *main* line from Perth to Inverness is that by the Carr Bridge route, though a service of through carriages, &c., is given by the Forres route for the convenience of passengers to and from Grantown, Forres, Nairn, &c.

[Reply to H. F.]

A Locomotive Comparison.

Nominal tractive effort of No. 2222 *Sir Gilbert Claughton*, 4-cylinder 4-6-0, London and North Western Railway, is 23,000 lb. at 80 per cent. working pressure, but of the newer "Claughtons" with 15¾ in. cylinders it is 22,300 lb. As originally built, No. 443 of the London and South Western Railway had a nominal tractive effort of 23,700 lb., but when superheated, the cylinders were not increased in size, and the working pressure was reduced from 200 lb. to 175 lb., with the result that the present figure is 20,730 lb.

[Reply to C.L.B.]

Mallet Compounds in America.

The 2-10-0-0-10-2 "Mallets" of the Virginian Railroad, U.S.A., described and illustrated in the January issue, are required to run over a route which includes 11½ miles' ascent at 1 in 48, and thus two of these mammoths as "pushers," with a 2-8-0-0-8-2 "Mallet" at the head of the train, are needed to work a load of 5,850 tons at one operation. The new "Mikado" engines of the Grand Trunk Pacific Railroad of Canada can handle 6,000 tons on a level track, which is a very different matter.

[Reply to R. COTTON.]

0-6-0 Superheater Engines, Midland Railway.

No. 3835, the pioneer of this type, was illustrated and fully described in our contemporary, *The Locomotive*, of January,

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1912. We have no information as to how many of the type will be built in addition to the 40 at present in service. Your details as to haulage are interesting, but you must not deduce too much in the way of comparison of tractive power from the loads seen behind different engines on different railways, as there are many factors beyond these to take into account.

[Reply to L. FORD SMITH.]

Dimensions of the 3835 class are as follows: Cylinders, 20 in. dia. by 26 in. stroke; driving wheels, 5 ft. 3 in. dia.; heating surface: tubes, 1,045 sq. ft., firebox, 125 sq. ft., superheater, 313 sq. ft; total, 1,483 sq. ft.; grate area, 21.1 sq. ft.; working pressure, 160 lb. per sq. in.; weight in working order, 40 tons 2 cwt.; weight of tender, with 2,950 gallons of water and 4 tons of coal, 39 tons; total weight, engine and tender, 88 tons 2 cwt.

[Reply to E. V. ARBRON.]

Some London and North Western Queries.

On both the Cambridge and Peterborough branches of the London and North-Western Railway the engines principally employed are of the 2–4–0, or "Precedent" class, for passenger service, and the 0–6–0 "DX" and smaller 17 in. 0–6–0 classes for goods service, although other types are, of course, not infrequently seen on both branches. "Precedent" class engines occupy their time mainly on branch passenger service and on main line piloting duties.

[Reply to "PRECURSOR."]

Locomotive Colours on the Great Northern Railway.

Both the 1630 and 1640 series of 2–6–0 engines on the Great Northern Railway were painted green when first constructed, as they were considered as mixed traffic or semi-passenger in character. But the subsequent engines of this wheel arrangement are painted grey as a war-time measure, while the original engines are also reappearing in the grey livery as they go into the shops for overhauling. The new three-cylinder 2–8–0 coal engine, No. 461, was painted grey on construction.

[Reply to S. C. SEARLS.]

Blockage of Main Railway Routes.

Arrangements made whereby the through expresses of one company travel over the metals of another, as an alternative route, in cases where the lines of the former have been blocked by accidents or for other reasons (as, for example, the use by the Midland Company of the London and North-Western metals between Carlisle and Ingleton after the Aisgill and Langwathby accidents) are entirely matters of mutual accommodation between the companies concerned.

[Reply to "ENQUIRER."]

Through Trains.

No through trains are worked by the London, Brighton and South Coast Railway Company between Tunbridge Wells and Tonbridge (South-Eastern and Chatham Railway), neither does the London and South-Western Railway run through trains from London to Exmouth. Reversal would be required at Exeter (Queen Street) if the latter were done. None of the West Coast Scotch expresses, down or up, calls at Watford Junction, London and North-Western Railway.

[Reply to C. E. BEAMES.]

An Engineering Problem at Princes Risborough.

The down road of the Great Western and Great Central Joint Line south of Princes Risborough follows the route of the old single Great Western line, but is on a steeply-falling gradient into the station. In order to ease the gradient for up trains, the up line was constructed with a flatter gradient on a new location which required less cutting than if the old route had been adhered to. Up and down lines therefore separate between Saunderton and Risborough.

[Reply to E. J. K.]

Double Heading on the Great Central Railway.

You will find this subject dealt with at considerable length in Mr. Cecil J. Allen's "British Locomotive Practice and Performance" in the November RAILWAY MAGAZINE of last year. We should have thought that the vastly harder gradients of the Great Central Railway, in addition to the higher scheduled speed (as compared

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with the London and North-Western Railway) would suggest themselves to you as reasons for this piloting.

[Reply to "COTTER."]

A Locomotive Difficulty on the Great Western Railway.

In all probability the "iron box-like structure, directly over the cylinder, reaching half way up the smoke-box," seen by you on 4-6-0 engine No. 2927, was a temporary shelter erected in order to enable an observer to take records of smoke-box pressures (*i.e.*, vacuum) while the engine is running. The apparatus required is a simple U-tube mercury arrangement, which is readily fitted when required.

[Reply to N. R. DOUST.]

Speed Indicators.

Estimation of speed in this country is left entirely to the driver's judgment, with the exception of the few cases in which locomotives have been fitted with speed indicators. We are informed by several readers that the bulk of the express tank engines on the London, Brighton and South Coast Railway are so equipped, however, as well as a few of the 4-4-0 express engines on the London and North-Western Railway.

[Reply to A. L. PELLING.]

Passenger Locomotives on Goods Service.

Shortage of goods locomotives, as a result of the abnormal munitions traffic, accounts for the large extent to which passenger engines are now employed on goods trains, the passenger engines themselves being freed for this duty in consequence of the curtailment of passenger services. Such a condition of affairs is by no means confined to Scotland, but is now quite general.

[Reply to LIEUT. W. A. C. MCCONNELL.]

Some Light Railway Queries.

A total of eight locomotives and one steam rail motor car is owned by the Kent and East Sussex Railway, and two locomotives by the Bishop's Castle Railway, all tank engines of standard gauge in each case. The gauge of the Campbeltown and Machrihanish Light Railway is 4 ft. and of the Isle of Man Railways is 3 ft. 6 in. All information of this character you can obtain first-hand from the *Railway Year Book*.

[Reply to "F. Y. & N."]

Inchicore and Liffey Junction.

Inchicore station, Great Southern and Western Railway, is now closed. Liffey Junction (Midland Great Western Railway) is not now used by any trains on the main line of the Midland Great Western Railway, but has one early morning passenger train to North Wall, worked by the English London and North-Western Railway *via* Glasnevin Junction, West Road Junction and Church Road Junction.

[Reply to J. H. SEWELL.]

"The Fastest Train in the British Empire."

There is no faster authenticated record between Darlington and York, North-Eastern Railway, than that made by Driver Watson, on No. 1672 (4-4-0, Class R), when the 44 miles 8 chains between these points were covered in 39 min. 34 sec., start to stop. Faster runs have, however, been made on other lines, notably the Great Western Railway.

[Reply to A. DICKINSON.]

Great Central Railway Locomotives.

The 4-4-2 tank engines removed from Neasden shed are now mainly employed on local services around Leicester, Nottingham, Sheffield and Manchester. As a temporary measure a shade of French grey (not blue as you state) has been adopted as a livery for new Great Central Railway locomotives, whilst they are working their trial runs.

[Reply to G. H. WALLIS.]

Special Passenger Trains, London and North-Western Railway.

On the London and North-Western Railway special passenger trains usually carry at the foot of the chimney or the centre of the buffer-beam a white head-board with black lettering showing the special time-table number of the train concerned, for the information of signalmen and others. This board appears in the illustration on page 30 of the January issue.

[Reply to D'A. EDMONDSON.]

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British and Continental Loading Gauges.

Although it is safe and practicable to run 4 ft. 8½ in. gauge vehicles on the 4 ft. 9 in. Continental gauge, it is not so much so to reverse the process, owing to the tightness of gauge tending to increase flange friction and to spread the road, in addition to the increased loading gauge difficulty.

[Reply to E. A. D.]

2-8-0 Compound Engines, Northern Railway of France.

It must be remembered that owing to the more generous proportions of the Continental loading gauge, these are considerably larger and more powerful engines than the Great Central design standardised by the War Office, which would account largely for the increased tractive ability that you have noted.

[Reply to "INTERESTED IN ALL 2-8-0's."]

Engine No. 2299, Midland Railway.

It is not practicable to publish full details of this engine until they are supplied by the Midland Company. The two 0-6-0 tender engines of the London, Tilbury and Southend section of the Midland Railway are numbered 2898 and 2899, and not as stated by the writer to which you refer.

[Reply to "JANITOR."]

Some Scottish Locomotive Queries.

There are 20 "Atlantic" type express engines on the North British Railway, and 12 locomotives of the 2-6-0 type on the Glasgow and South-Western Railway. See instructions at the head of these columns as to the number of questions which may be submitted in any one month.

[Reply to ROY ANGUS.]

A Locomotive Query on the London, Brighton and South Coast Railway.

We are not able to trace any London, Brighton and South Coast locomotive subsequent to the "Terrier" 0-6-0 tank No. 40 having borne the name *Brighton*, but 0-6-2 tank engine No. 158, built in 1891, received the name of *West Brighton* at the time of construction.

[Reply to K. PATON.]

South-Eastern and Chatham Railway Pullman Cars.

The Pullman car *Galatea* which you have noted running on the South-Eastern and Chatham Railway has been transferred from the Metropolitan Railway, and not the Caledonian Railway, as you state, and also runs on eight wheels, not twelve.

[Reply to HAROLD CHASE.]

4-4-0 Compound Engines, Midland Railway.

Above engines are among the heaviest of this wheel arrangement running in the country, weighing as they do all but 60 tons in working order. A boiler of larger diameter would increase their weight above permissible track loading limits.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Metropolitan Railway Extension Line.

Electrification of the main line of the Aylesbury extension ceases at Harrow, but the Uxbridge branch from Harrow is, of course, electrified. The 0-6-4 tank engines employed on the Aylesbury line number four in all.

[Reply to N. M. P.]

A North British Railway Line.

We cannot understand to what you refer, unless it be the diversion of the main line at Marshall Meadows carried out about 34 years ago, owing to the danger to the then existing line by the inroads of the sea.

[Reply to "BARNTON CUDDY."]

Westinghouse Brake.

Half-a-dozen Great Central Railway engines are fitted with the Westinghouse brake apparatus, viz.:—Nos. 700, 705, 857, 859, 869, 876. These six locomotives are of the 4-4-0 express passenger type.

[Reply to P. H. O. BANYARD.]

Great Western Railway "Record of Records."

You are correct in stating that the speed of 102.3 m.p.h. attained on this journey in the descent of Wellington Bank is the highest duly authenticated speed record in this country. The date of the run was May 9th, 1904.

[Reply to "VELOCITY."]

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Central London Railway.

Until the extension of the railway to Gunnersbury is more within the range of practical politics no reply can be given to your question. Regarding your remarks about the Central London trains running over lines now equipped with the negative rail in the 4-ft. way, obviously they could not do this with their present equipment.

[Reply to "RIFLEMAN."]

The Belpaire Firebox.

In a way it is correct to say the Great Central Railway was the first English line to adopt the Belpaire fire-box, but the title of the company was then the Manchester, Sheffield and Lincolnshire Railway.

[Reply to J. B. SALTMARSH.]

0-4-4 and 4-4-0 Tank Engines, Metropolitan Railway.

These engines have safety valves of the ordinary Ramsbottom type, but without the hand-lever into the cab usually fitted in order to enable the driver to relieve the pressure when necessary.

[Reply to "MET."]

Numbers inside Cabs of South-Eastern and Chatham Railway Engines.

Numeral inside of locomotive cab denotes the depôt at which the engine is stationed. As engine No. 448 has "5" inside the cab the figure denotes the locomotive is shedded at Tonbridge.

[Reply to W. E. SYDER.]

Locomotive Power Classification, London and South-Western Railway.

The small letters on London and South-Western locomotives to which you refer are for the purpose of classifying them according to their nominal tractive power.

[Reply to D'A. EDMONDSON.]

4-6-0 Engine No. 736, London and South Western Railway.

Weight in working order of this locomotive is 77 tons 10 cwt., and of the eight-wheeled tender 57 tons 8 cwt., total 134 tons 18 cwt.

[Reply to C. L. B.]

London and North-Western Railway Services.

Fastest pre-war time London (Euston) to Liverpool (Edge Hill) was 3 hr. 28 min. (192½ miles) and 3 hr. 35 min. to Lime Street. Fastest existing time is 4¾ hr. Fastest non-stop run on the London and North-Western Railway at present is by the 8.23 a.m. Irish mail, Willesden to Rugby, 77 miles in 91 min. = 50·8 m.p.h.

[Reply to J. B. E.]

Great Central Railway Locomotives.

We know of no book having been published that deals with the locomotive stock of the Great Central Railway.

[Reply to AUDLEY F. SUTTON.]

"Camel" Class Engines, Great Western Railway.

No. 3340, *Camel*, was the prototype of this class, all the engines of which, however, are now included in the *Bulldog* class.

[Reply to E. J. K.]

Snape Branch, Great Eastern Railway.

Passenger trains are not worked over this branch, but goods trains only. It has a length of 1 mile 32 chains.

[Reply to J. H. SEWELL.]

Midland and South-Western Junction Railway.

Map, historical sketch and other particulars concerning this line are included in the *Railway Year Book*.

[Reply to W. G. T.]

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Retirement of Sir John A. F. Aspinall.

By the retirement of Sir John A. F. Aspinall, the General Manager of the Lancashire and Yorkshire Railway, on January 31, the British railway service loses one of its oldest and most noteworthy officers.

Sir John commenced his career as a pupil of the late Mr. John Ramsbottom, and afterwards Mr. F. W. Webb, at the Crewe Works of the London and North-Western Railway. The early age of 24 found him manager of the locomotive and carriage and wagon works of the Great Southern and Western Railway at Inchicore, Dublin. He left Ireland in 1886 to take up the newly-created position of Chief Mechanical Engineer of the Lancashire and Yorkshire Railway, this being the first occasion on which this title was given to a locomotive engineer.

To Sir John (or Mr. Aspinall as then he was) fell the task of designing and laying out the Horwich Works of the Lancashire and Yorkshire Railway Company. These works were described and illustrated in THE RAILWAY MAGAZINE, August, 1913. Special mention should be made of the large number of pupils and others who started their careers at Horwich and benefited by the educational opportunties placed within their reach to such an extent that they have been able to obtain lucrative positions on some of the most important railways in the world.

During the 13 years he served as Chief Mechanical Engineer, numerous honours were bestowed upon him, but perhaps the most notable was that by the Institution of Civil Engineers in the Watt Gold Medal for his paper on "Train Resistance" (1901–2). This paper dealt with the result of experiments carried out with a dynamometer car on the Lancashire and Yorkshire Railway to record the tractive effort required to haul modern railway carriages. The paper stated that a long series of experiments—the results of which were not recorded therein—had been previously tried, but that the effect of the wind on the trains was such as to require a much closer investigation into this special branch of the subject. The records then presented were the result of a careful set of experiments made with a view to showing how much more important the question of wind pressure was, as affecting trains, than any other item in the total resistance.

In 1899, the Lancashire and Yorkshire Railway directors required a successor to Mr. Stafford as General Manager, and they departed from their previous practice of selecting an officer from the Traffic Department, and offered the position to Mr. Aspinall, and he accepted it. It is noteworthy that of the other managers of leading British railways in July, 1899, only two of them, Mr. David Cooper, Glasgow and South-Western Railway, and Mr. W. D. Phillipps, North Staffordshire Railway, are still in harness.

As General Manager, Mr. Aspinall proved an unqualified success. He brought his wide experience of the mechanical side into touch with traffic organisation, particularly as regards the establishment and working of through passenger train services in conjunction with other companies, main-line widenings and running loops, heavier goods trains loaded up to the capacity of the locomotives, higher capacity goods vehicles, which resulted in less dead haul, better paying loads and economy in working.

One of the earliest matters to which, as General Manager, he directed his attention, was railway communication with the rapidly developing new coalfield in South Yorkshire, and he foresaw what has since proved to be correct, that an immense trade would be done in hard steam coal for bunkering and manufacturing purposes in Lancashire and Yorkshire.

In getting railway Bills through Parliament, Mr. Aspinall took a prominent part, and made no small reputation in many a severe contest in the Committee Rooms at Westminster. The Irish cattle-carrying

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trade attracted his attention. After much opposition powers were obtained, the old Drogheda Steam Packet Company was absorbed by the Lancashire and Yorkshire Railway Company, and up-to-date steamers put on the route. These are the only steamers owned by a railway company running from Liverpool.

After strenuous opposition, Parliamentary powers were secured for the Lancashire and Yorkshire Railway to run its own vessels from Goole and Hull to the principal ports in Northern Europe. Prior to the war, the company had 28 steamers flying its flag, and was the largest steamship owner amongst British railways.

RAILWAY MAGAZINE readers may recall that Sir John Aspinall was practically the discoverer of Zeebrugge, now so famous through the war, and it was owing to his energy and foresight his company ran the first steamer up the ship canal to Bruges, and carried on, up to the outbreak of war in 1914, a well-patronised passenger service between Hull and Zeebrugge.

Sir John will long be remembered as one of the pioneers of railway electric traction in Great Britain. The remarkable developments which have taken place in this respect on the Lancashire and Yorkshire Railway between Liverpool and Southport Crossens, Aintree and Ormskirk, and, later on, between Manchester and Bury are well-known to most RAILWAY MAGAZINE readers. The latter electrification was illustrated and described in the RAILWAY MAGAZINE, March, 1916.

Wyre Docks, Fleetwood, another property of the Lancashire and Yorkshire Railway, received much fostering care from Sir John, as will be seen by reference to our article in June, 1915, while the efforts he has more recently made to increase England's supply of food will be found in an illustrated article, "Fleetwood and the Nation's Fish Supply," that appeared in the RAILWAY MAGAZINE, February, 1918.

During his occupation of the post of General Manager, Sir John has never lost touch with engineering matters. He is Past-President (two years) of the Institution of Mechanical Engineers, and is now in possession of the "blue riband" of the profession as President of the Institution of Civil Engineers. A report of his election to this position, together with his portrait, was included in the RAILWAY MAGAZINE, December, 1918. Sir John was knighted in 1917 on the occasion of the King's birthday.

RAILWAY MAGAZINE readers will join us in wishing Sir John A. F. Aspinall a long and pleasurable retirement and also in congratulating Major A. Watson, C.B.E., Superintendent of the Line, and Assistant General Manager, who has been selected by the Lancashire and Yorkshire Railway Directors to succeed him. Major Watson has had a distinguished railway career, which makes him well worthy of following a predecessor so notable as the subject of these notes. Major Watson's portrait was published in the RAILWAY MAGAZINE, June, 1918.

The late Robert Weatherburn.

WE record with regret the death, on January 2nd, of Mr. Robert Weatherburn, who retired in 1906 from the position of Midland Railway London District Superintendent at Kentish Town.

Mr. Weatherburn belonged to one of the oldest engineering families in Great Britain. Mr. Weatherburn's father did good service at the now historic Rainhill trials, and afterwards opened the Leicester and Swannington Railway, which was really the precursor of the present Midland Railway.

The deceased engineer began his career in the famous locomotive works of Messrs. Kitson and Co., Leeds, and afterwards entered the service of the North Eastern Railway at York. Then he had marine engineering experience at Birkenhead, followed by a short sojourn on the Lancashire and Yorkshire Railway, and the North Eastern Railway at York. He returned thence to Messrs. Kitson and Co., in whose service he became known on nearly every railway in the United Kingdom. In Kitson and Co.'s employ he travelled in Russia, Denmark and Germany, where he was a keen observer of foreign practice. His last experience abroad was in Metz, during the years 1872 and 1873, in conjunction with the German Railway Corps of the Franco-German Army.

Returning to England, he took service with Messrs. R. Stephenson and Co., locomotive builders, Newcastle-on-Tyne, but afterwards became Midland Railway District Locomotive Superintendent successively at Liverpool, Leicester and London. At Kentish Town he remained twenty years, until his retirement.

Mr. Robert Weatherburn was an enthusiastic supporter of THE RAILWAY MAGAZINE and a frequent contributor to its pages. His principal work in the latter direction was a series of articles entitled "Leaves from the Log of a Locomotive Engineer." The first of the series appeared in October, 1912, and the last in December, 1914. Mr. Weatherburn's writings were followed with keen interest by a great number of readers, whom, we are sure, will share with THE RAILWAY MAGAZINE, the regret already expressed at his decease.

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Refrigeration and Railway Transit.

MR. A. J. BRICKWELL, who in railway life is Surveyor and Estate Agent to the Great Northern Railway, but at present is acting under Government as the Director of Cold Storage, in an interview with our contemporary *Cold Storage*, dwelt on one feature of work which has been accomplished in connection with refrigerated transit. This was the emergency measure undertaken for the equipment of a considerable volume of goods rolling-stock to enable the rush of frozen meat and other refrigerated traffic to be more efficiently dealt with. As has already been announced it was decided to insulate some 1,500 railway wagons of various types, fruit vans, covered vans, &c. Of these about 1,200, Mr. Brickwell said, have been completed, and as the full capacity of such cars is 7 tons each, it will be seen that the total available refrigerated carrying capacity on our railways will be more than doubled when the work is finished. The work was undertaken on the initiative of the Cold Storage Section, and the Railway Executive Committee through a sub-committee of railway goods managers and wagon superintendents organised the fitment of the cars at convenient points on the various railway systems. Generally speaking, the type of construction of the cars lent itself to the insulating work, cork, wood-wool or other filling being applied to the air-spaces in the lining of the cars. This work, as an emergency measure, was approved by Mr. R. Balfour, Consulting Engineer to the Cold Storage Section of the Ministry.

Time Table Revision.

SOME commencement of a reversion to peace-time travel conditions was apparent in the January time-tables of various companies, more especially the Great Eastern Railway. On this line the 8.15 a.m. *ex*-Liverpool Street once again becomes a breakfast car express to Norwich, calling at the principal intermediate stations, the slow working between London and Ipswich being taken up by the reinstated 9.16 a.m. train from London. The 3.10 p.m. *ex*-Liverpool Street is permanently divided, the Cromer portion, at 3.10 p.m., calling first at Colchester at 4.19 p.m., and then at Ipswich, while the Yarmouth portion follows at 3.15 p.m., making the usual stops. A fast portion is run from Ipswich to Yarmouth in connection with the 5.23 p.m. from Liverpool Street, reaching South Town at 8.53 p.m.—an acceleration of 30 min. from London. In the reverse direction two important trains are reinstated—the 3.28 p.m. from Norwich to London, due in Liverpool Street at 6.32 p.m., and the 12.21 p.m. from Ipswich, calling only at Colchester, and reaching town 66 min. later—at 1.58 p.m. Luncheon and tea cars are attached to the 1.10 p.m. from Norwich to London (due 5.0 p.m.). On the Cambridge line the 2.18 p.m. down Norwich and Hunstanton train reverts to its time-honoured departure hour of 2.35 p.m., and omits all stops between Bishop's Stortford and Cambridge except Audley End, the 2.52 p.m. "slow" from London being reintroduced to take up this working. Dining cars are attached to the 5.52 p.m. from Liverpool Street to King's Lynn, and return as breakfast cars on the 7.16 a.m. *ex*-King's Lynn, which is once again run through to London in advance of the Norwich train, calling only at Cambridge after leaving Ely. The non-stop run from Cambridge to Liverpool Street is allowed 74 min., and the arrival time is 10.23 a.m. In the suburban district the principal change is the reopening of the Woodford-Ilford line on Sundays, and the provision on practically all the London suburban branches of at rain service, at exactly hourly intervals, from mid-day onwards. These changes have been effective from January 12th. From the end of December extra late or "theatre" trains have been run on weekdays from Liverpool Street to Enfield Town, Chingford, Loughton, &c., and prior to that time steps were taken early after the signing of the armistice to augment the exceedingly scanty mid-day services on weekdays over the same sections of the line. On the North Eastern Railway over thirty cancelled branch line trains were reinstated on January 1st, while a still more important alteration was the return of the popular 9.38 a.m. express from York to Edinburgh to the time-tables. This train (which is a continuation of the 8.55 a.m. from Leeds) calls only at Newcastle (11.15—11.23 a.m.) to Edinburgh, reached at 1.55 p.m., or 5 min. later than previously. The 6.25 p.m. express from York to Newcastle also receives much-needed relief in the reinstitution of the 6.8 p.m. train, calling at Darlington only (7.4—7.12 p.m.) and getting to Newcastle at 8.5 p.m. On the London and North-Western Railway a notable alteration is the regular running of the Birmingham portion of the 1.0 p.m. Scotch express *ex*-Euston as a separate train at 1.20 p.m., non-stop to Rugby in 100 min., and accelerated 17 min. to Birmingham and 20 min. to places beyond. An explanation is also given in the public time-tables of the 235 min. required by the 9.0 p.m. down Irish Mail to run—apparently

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non-stop—to Crewe, as stops are now advertised at Rugby, Tamworth and Stafford.

New 2-6-0 Type Engines for the Great Northern Railway.

WE illustrate on the opposite page one of the new locomotives of the 2–6–0 type recently supplied to the Great Northern Railway by the North British Locomotive Company. These engines, which have been built to the designs of Mr. H. N. Gresley, the company's locomotive engineer, are the same, as regards general appearance and proportions, as the previous engines of the "H-3" class built at Doncaster, except that the main steam pipe is taken to the top of the steam chest instead of passing through the bottom of the smoke-box, this arrangement being similar to that used on the company's 2–8–0 type locomotive. It ensures a straight direct passage for the steam free from bends of any sort.

The locomotives of the 2–6–0 type are giving general satisfaction on the Great Northern Railway, and although officially classed as express goods engines, they are, in actual service, employed for mixed traffic on a wide scale, working both fast and stopping passenger trains in turn with heavy goods trains, and giving equally good results in both spheres. The design is an excellent one, and the workmanship, both in the Doncaster-built and North British Locomotive Company's engines, of the highest class.

The leading particulars are as follows:—

Cylinders, diameter ..	20 in.
,, piston stroke..	26 in.
Coupled wheels, diameter	5 ft. 8 in.
Leading wheels, diameter	3 ft. 2 in.
Coupled wheelbase ..	16 ft. 3 in.
Total engine wheelbase ..	25 ft. 2 in.
Boiler, diameter (firebox end)	5 ft. 6 in.
Length between tubeplates	12 ft.
Height of centre from rail	8 ft. 8½ in.
Heating surfaces, tubes—	
(206 by 1¾ in.) ..	1,131·5 sq. ft.
(24 by 5¼ in.) ..	395·5 sq. ft.
Firebox 24-element super.	152 sq. ft.
24-element superheater (tubes 1¾ in. int. dia...	305 sq. ft.
Heating surface, total ..	1,984 sq. ft.
Grate area	24 sq. ft.
Boiler pressure	170 lb. per sq. in.
Weight of engine in working order	64 tons 8 cwt.
Adhesion weight ..	53 tons 18 cwt.

There is ample scope for engines of this description on British railways. They may be said to fill a place for which other types are unsuitable in an all-round sense, and the proportions adopted in the design to which we are now referring are well calculated to meet the varying requirements of the work demanded by the service to which the locomotives are put.

The tender is of the standard Great Northern Railway six-wheeled pattern, with a coal capacity of 6½ tons and water capacity of 3,500 gallons. The wheels are 4 ft. 2 in. diameter, and the wheelbase 13 ft. The weight of the tender in full working order is 43 tons 2 cwt.

New Mixed Traffic Locomotive, G.C.R.

THERE appears to be no limit to the fertility in design of Mr. John G. Robinson, M.I.C.E., Chief Mechanical Engineer of the Great Central Railway, and the latest locomotive type to be turned out of Gorton Works is illustrated in the "British Locomotive Practice and Performance" pages of this issue. This particularly handsome and symmetrical machine—No. 416—is intended for express fish and other mixed traffic service, and is interesting in that it embodies a reversion to the outside cylinder arrangement for engines of this type, from which Mr. Robinson departed temporarily in his "Glenalmond" class. The boiler is designed to be interchangeable with that of the new large-boilered 2–8–0—No. 412—and the cylinders and motion of the two classes generally are interchangeable. Principal dimensions of No. 416 are as follows:—Cylinders, 21 in. diameter by 26 in. stroke; driving wheels, 5 ft. 8 in. diameter; bogie wheels, 3 ft. 6 in. diameter; heating surface: tubes 1,641 sq. ft., firebox 174 sq. fr., superheater (28 elements) 308 sq. ft., total 2,123 sq. ft.; grate area, 26 sq. ft.; working pressure, 180 lbs. per sq. in.; adhesion weight, 53 tons 18 cwt.; weight of engine in working order, 72 tons 18 cwt.; weight of tender in working order (with 4,000 gallons of water and 6 tons of coal), 48 tons 6 cwt.; total weight of engine and tender, 121 tons 4 cwt. The bogie has a total cross-travel of 6½ in., which enables the engine to traverse curves of as short a radius as 5 chains. As will be evident from the photograph, the new engine is somewhat smaller than those of the "Glenalmond" class, the boiler being shorter and the weight nearly 2 tons less.

Locomotive Nomenclature.

FROM Balham Mr. J. H. Hobbs writes:—Mr. Ahrons' genial gibes at the Mudborough and Sludgeville department of the London, Brighton and South Coast engine nomenclature make excellent reading. *Shoreditch* deserves all it may get. *Itchingfield*, I suppose, is more or less an acquired taste. But *Ditch-*

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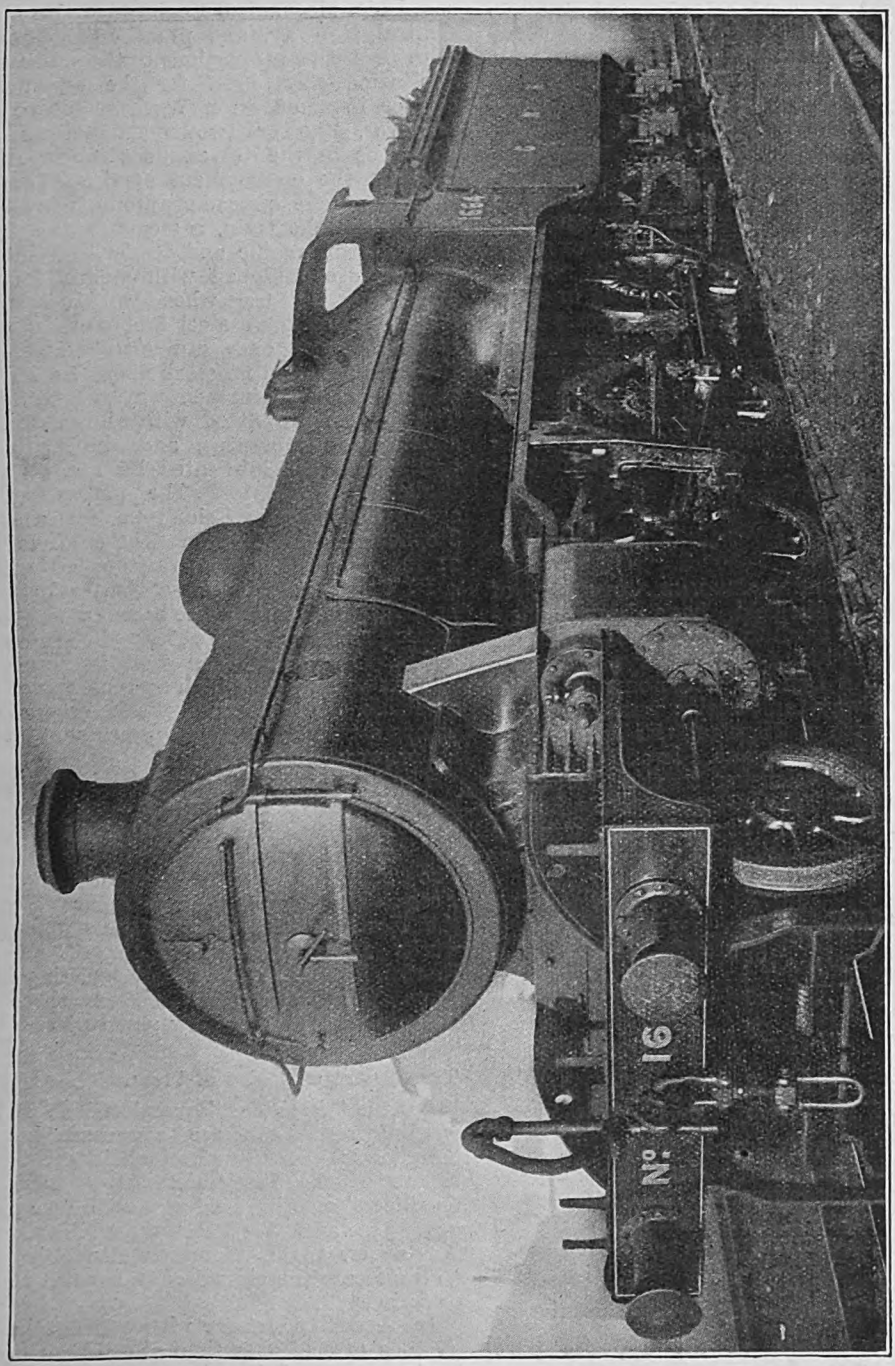

2-6-0 Type Locomotive, built for the Great Northern Railway by the North British Locomotive Co., Ltd.

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ling? I am amused to recall that in an article in *Notes and Queries* on the naming of engines I cited half-a-dozen London, Brighton and South Coast names as specimens of the beautiful in place-names, and among them *Ditchling:—Dorking, Broadwater* and *Aldingbourne; Ditchling, Chiddingfold* and *Imberhorne*.

The fact is, of course, that a name is to be judged by its *sound* and not by the associations called up by one or other of its component parts. A ditch may not be a thing of beauty and a joy for ever; but *Ditchling* is none the less a very fine name—certainly as dignified as *Richmond* or *Lichfield*. And if *Kitchener* never suggests cooking, why should *Crawley* suggest creeping?

Some names, however, are undoubtedly less acceptable than others, and I think the Brighton authorities might have drawn the line at *Borough, Tooting, Fishergate, Puttenham, Lodsworth* and *Cosham*. Not to mention *J. Gay* and *Caen!*

Extremes Meet.

THE YORKSHIRE ENGINE COMPANY, of Wincobank, Sheffield, have been undertaking repair work to locomotives belonging to various British trunk railways, and a few weeks ago a London, Brighton and South Coast Railway tank engine was to be seen coupled with a Highland Railway 4–4–0 express passenger engine. In addition, there were engines belonging to the Caledonian Railway and the Glasgow and South-Western Railway. The following was the complete row—awaiting repair—in the order named:—

L.B. & S.C.R.	473	0-6-2 T	
H.R. ..	62	4-4-0	*Ben a'chaoruimm.*
H.R. ..	128	4-4-0	*Loch Maree*
Cal. R. ..	8	4-4-0 T	
Cal. R. ..	9	4-4-0 T	
G. & S.W.R.	370	0-6-0	

That "Brighton" and "Thurso" should be thus represented at Sheffield is worthy of comment, remarks Mr. S. T. T. Geary, who has communicated this item to THE RAILWAY MAGAZINE.

British Engines for France.

THE illustration on the opposite page shows a group of three 2–8–0 type locomotives recently constructed by the North British Locomotive Company for service on the standard gauge railways in France. These engines are built in accordance with the design originated by Mr. John G. Robinson, Chief Mechanical Engineer of the Great Central Railway, and practically identical with regard to proportions to the engines of the same class built for the company's service in the Gorton Works. There are, however, one or two modifications and additions in the Government locomotives, such as the employment of the Westinghouse air brake, instead of automatic vacuum fittings for the train, a steam brake being provided on engine and tender, whilst the engines are equipped with steam heating apparatus for use when working troop trains. They have steel fireboxes in place of the copper ones ordinarily used, and they are designed for work upon the French standard gauge permanent way of 4 ft. 8½ in. The boilers are fitted with the Robinson superheater apparatus, and the cylinders and valves are lubricated by means of a Wakefield lubricator. The piston valves are of the inside admission type, actuated by Stephenson's link motion. The engines have 21 in. by 26 in. cylinders, coupled wheels 4 ft. 8 in. diameter on a rigid wheelbase 11 ft. 4½ in., total wheelbase 25 ft. 5 in., heating surface total 1,756 sq. ft., grate area 26¼ in. The weight in working order is 73 tons 17 cwt., of which 67 tons 3 cwt. are available for adhesion. Each engine develops a tractive force at 75 per cent. of its boiler pressure of 27,640 lb.

The tender is of the six-wheeled pattern, having wheels 4 ft. 4 in. diameter, a wheelbase of 13 ft. The tank capacity is 4,000 gallons, and 6 tons of coal can be carried. The weight of the tender when full is 49 tons 2 cwt. The locomotives were constructed at the North British Locomotive Company's works under the supervision of Messrs. Rendel, Palmer and Tritton, consulting engineers. The photograph shows three of them in readiness for shipment to France.

The American Point of View.

ON the "large car" question "C. S. S.," writing from Tennessee, expresses himself as follows:—I read with much interest your report of the Institution of Locomotive Engineers' meeting held at Leeds (see pages 343, 344 and 345, RAILWAY MAGAZINE, November, 1918). Some of the objections to large cars therein stated I cannot regard as serious.

(1) A coal merchant who cannot handle 40 tons of coal at a time should go out of business. Doubtless it would be a convenience to be able to have one ton of coal shipped at the same rate of freight as a truckload, but this cannot be done.

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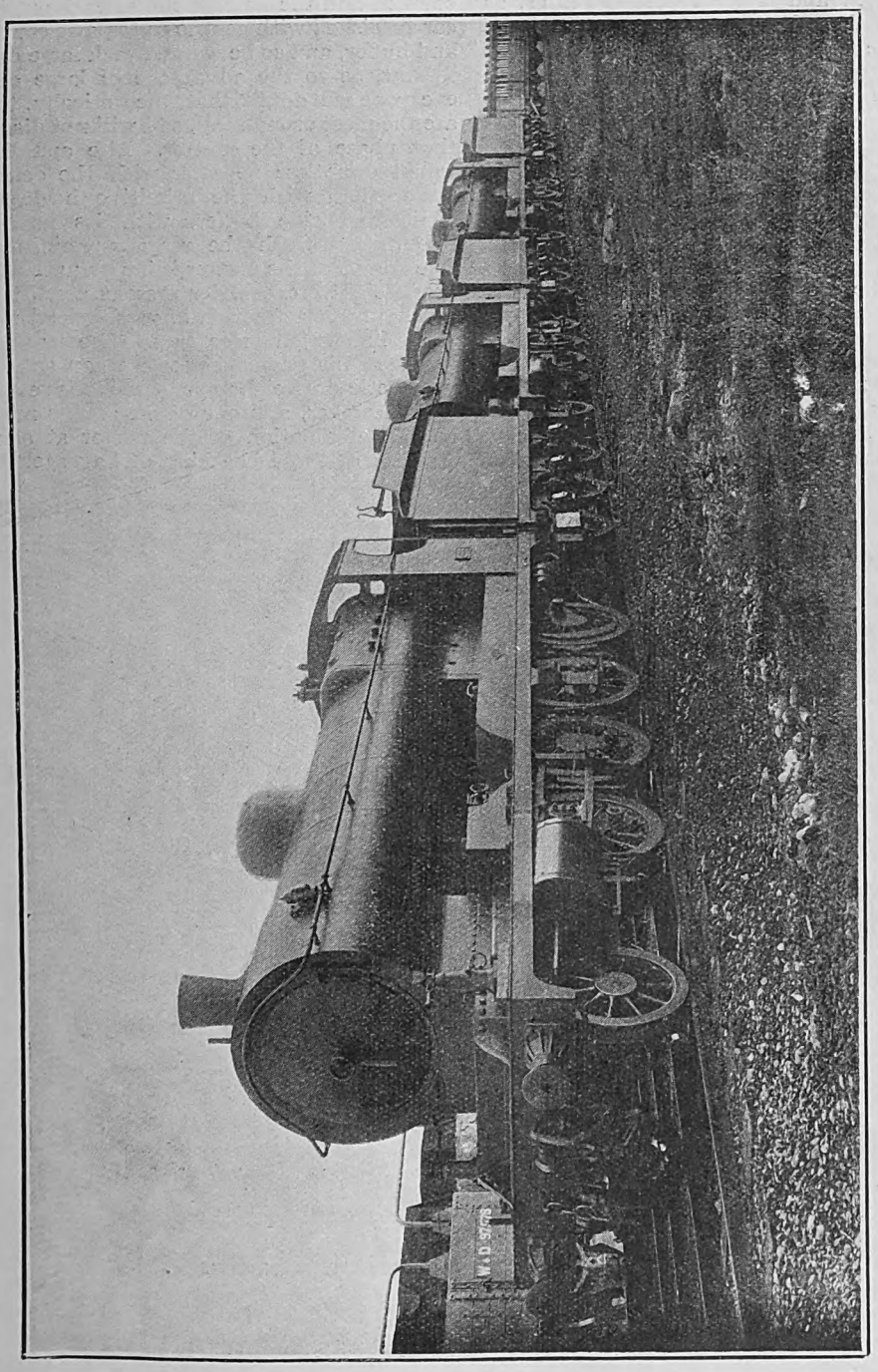
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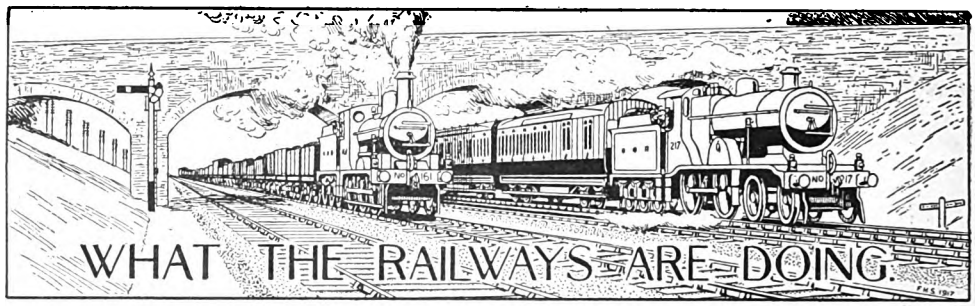

FOLLOWING the retirement of Sir Guy Granet at the end of 1918 from the General Managership of the Midland Railway, the Directors have selected Mr. Frank Tatlow, Deputy General Manager, to succeed him. For many years principal assistant to the General Manager, Midland Railway, Mr. Tatlow was appointed during the latter months of 1915 to the new position of Assistant General Manager. Mr. Tatlow has been associated with the General Manager's Department from the time he entered the railway service as a boy. He has the distinction of having been personally connected with every General Manager the Midland Railway has had—Sir James Allport, Mr. John Noble, Mr. Geo. H. Turner, Mr. John Mathieson and Sir Guy Granet. During the latter's absence on Government work, Mr. Tatlow has acted as Deputy General Manager.

* * *

The Directors of the London and North-Western Railway have appointed Mr. Stanley H. Hunt as Chief Goods Manager from January 1, 1919. Mr. Hunt entered the service at Liverpool Waterloo Goods Station in 1880. In 1896 he was appointed Goods Agent at Canada Dock, and shortly afterwards became Chief Clerk to the District Goods Manager at Liverpool. Two years later he filled the position of Assistant District Traffic Superintendent at Lancaster. In February, 1902, Mr. Hunt was brought to London as Assistant Goods Superintendent at Broad Street, and in the following year he went to Garston Docks as Traffic Superintendent. When in 1910 the company established a new Commercial Department, Mr. Hunt was again transferred to London as Chief of the Buying and Sales Department, receiving the title of Assistant to General Manager. Soon after the outbreak of war Mr. Hunt accompanied Sir Guy Calthrop to France on an inquiry in connection with the Red Cross Society, and later he was selected to go with Sir Francis Dent to Egypt and Salonica on another important mission. When Sir Guy Calthrop was invited by the Government to undertake the difficult task of Coal Controller, Mr. Hunt and Sir Richard Redmayne were called upon to act as his Chief Assistants, and the former has remained with the Coal Controller up to the present time. Mr. Hunt has entered upon his new post with the cordial good wishes of all his colleagues, by whom he is much esteemed, and his appointment is also a popular one with the general staff, by whom he is greatly respected.

Mr. STANLEY H. HUNT,
Appointed Chief Goods Manager, London & North-Western Railway.

* * *

SIR VINCENT RAVEN has, owing to the armistice, resigned his appointment, under the Admiralty, of Controller of Armament Production, and has, we understand, resumed his duties of Chief Mechanical Engineer of the North Eastern Railway. During the war Sir Vincent Raven also held important positions at the Ministry of Munitions, and, from September, 1915, to May, 1917, was Chief Superintendent of Ordnance Factories, Woolwich Arsenal.

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MR. HERBERT E. JONES, M.I.Mech.E., Locomotive, Carriage and Wagon Superintendent of the Cambrian Railways, retired at the end of the year after a railway career extending over a period of 47 years. Mr. Herbert E. Jones entered the service of the Midland Railway in 1872, and after filling various positions, including that of District Locomotive Superintendent at Manchester, he accepted, in March, 1899, his present position, which he has thus held for nearly 20 years. Mr. Jones is a Past President of the Association of Railway Locomotive Engineers, and during the greater part of 1918 was Chairman of the Clearing House Committee of Locomotive Engineers and Carriage and Wagon Superintendents. Pending the choice of a successor, the Engineer, Mr. G. C. McDonald, has, at the request of the board, taken up the appointment of Acting Locomotive Superintendent, and, in addition to his present duties, has charge of the Locomotive, Carriage and Wagon Department until further notice.

* * *

SECOND LIEUTENANT IVOR WHITTINGHAM, of the 2nd Bedfords, who was on the business staff of the *Railway Gazette* prior to enlistment in Kitchener's Army in September, 1914, has been awarded the Military Cross "for bravery and leadership in action." This was gained in the last battle before the armistice. Lieutenant Whittingham enlisted as a Private and rapidly rose to the rank of Sergeant. He was wounded in the spring of 1916, invalided home, and received his commission early in 1918.

* * *

LIEUTENANT H. E. WARD, Royal Engineers, who was private secretary to Sir Alexander Kaye Butterworth, General Manager of the North Eastern Railway, for some years, has died from pneumonia following influenza while home on leave. He was given a commission in December, 1916, by Sir Eric Geddes, then Director of Transportation, and proceeded to France, and worked at headquarters under Sir Eric. Lieutenant Ward was extremely popular with his colleagues on the North Eastern Railway.

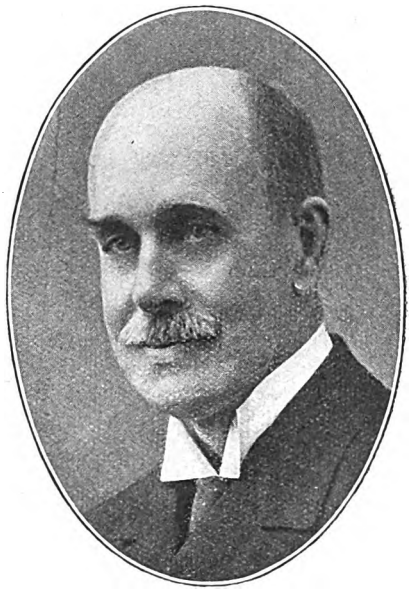
* * *

PASSENGER stations on the North British Railway which have been closed since January 1, 1917, will be re-opened for traffic on February 1, as follows:—Bargeddie, Campsie Glen, Yoker, Yorkhill, Causewayhead, Falkirk (Camelon), Dundee (Esplanade), Mount Melville, Boarhills, Pittenweem, Kingskettle, Saughton, Pinkhill, Craiglockhart, Blackford Hill, Easter Road, Leith Walk, Trinity, Granton, Crossgatehall (Halt), Glasson, Port Carlisle.

OUR correspondent, Mr. C. F. Dewey, 45, Pine Street, Sydney, N.S.W., Australia, wishes to exchange letters with one or two British readers of the RAILWAY MAGAZINE who may be interested in Australian railway matters.

* * *

MR. A. H. JOHNSON, who retired from the post of Signal and Telegraph Engineer to the London and South-Western Railway at the end of 1918, owing to a breakdown in health, commenced his railway career in the Locomotive Signal and Telegraph Departments of the Lancashire and Yorkshire Railway. He afterwards spent several years in New Zealand. About 27 years ago,



Mr. ARTHUR H. JOHNSON.
Late Signal and Telegraph Engineer, London & South-Western Railway.

Mr. Johnson accepted an invitation to lecture at Harvard University, and this was probably the first University lecture no railway signalling.

* * *

MR. G. PRITCHARD writes to us from Chester as follows:—"The employment of 2-cylinder 4-6-0's on the 9.40 a.m. ex-Chester North to West Express, G.W.R., seems now to have become general. Heading this train, I have recently noticed the following '29's.' No. 2,908, 'Lady of Quality,'' No. 2,902, 'Lady of the Lake,'' No. 2,939, 'Croome Court,' No. 2,926, 'Saint Nicholas,' and even No. 5,349, a 'Mogul.' There are a great number of the 'Consolidations' stationed at Chester, as a large quantity of Government

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coal passes through Chester. I also often see 'No. 1' a 2-4-0 side Tank, stationed at Birkenhead. For a short time recently, the mails for Ireland ceased to be carried by the 8.10 a.m. ex-Euston day Irish Mail, but this service has now been resumed."

"I recently noted a Webb 4-cylinder compound 4-4-0 on this train. As the train totalled about 400 tons, it was rather a tall order for this comparatively small engine."

* * *

MR. T. R. LACEY, who at the end of 1918 retired from the Midland Railway District Goods Managership at Leeds, entered the service of the Midland Railway as Junior Clerk at Lancaster in June, 1866. He was

Mr. T. R. LACEY,
District Goods Manager, Leeds, Midland Railway, 1909–18.

promoted in 1882 to Chief Goods Manager's Inspector and Canvasser for the northern section. In March, 1891, he was transferred to Bristol, holding the Chief Clerkship of St. Philip's Station for nine years. During this period the change from broad to narrow gauge took place on the Great Western Railway, and Bristol as an important transhipment station was specially affected. On January 1, 1900, Mr. Lacey was removed to Derby as Goods Agent, being further promoted in January, 1903, to the Goods Agency of Leeds and Armley. In October, 1907, he was appointed to the Manchester District Goods Managership. After holding the position for 18 months he returned in February, 1909, to the District Goods Managership of Leeds, the district including a part of Lancashire and the whole of the remaining four northern counties. Whilst occupying the Goods Agency of Derby, Mr. Lacey introduced a bonus system for shed and cartage workings, the marked success of which led to its subsequent adoption at Manchester, Leeds and Carlisle. In 1909 he was chosen as a representative of the Goods Department on the Midland Railway Conciliation Board, on which Lord Cromer was arbitrator, and he was also a member of the second Conciliation Inquiry in 1912 under Sir Robert Romer.

* * *

Since January 1 the North-West District of the North British Railway has been merged in the Western District, and all communications in connection with the Passenger Department should be addressed to Mr. John Ellis, District Superintendent, Glasgow.

* * *

"THE Labour Problem and British Railways and a National Guild of Railways," was the title of an extremely able paper read by Mr. B. M. Bazley ("Basil Mercer") at the January monthly meeting of the members of the Railway Club, 92, Victoria Street, S.W. Mr. Bazley dealt with the need for new ideals and new methods. The differences between railways and other industries were succinctly handled, while on several aspects of State management Mr. Bazley proved himself possessed of pronounced opinions. Mr. Bazley, without being antagonistic towards the railway industry, was decidedly sympathetic in his remarks concerning railway workers. He did not merely indulge in criticism, but had a suggestion, which though revolutionary and by no means Utopian, he argued could be introduced without fear of anarchy. He proposed that the State should put the entire management of British lines in the hands of railway workers to be worked and managed as a Railway Guild. An animated debate followed Mr. Bazley's novel suggestion. The annual meeting of the Railway Club will take place at headquarters, 7 p.m., Tuesday, February 4, and will be followed by a paper by Mr. H. L. Hopwood, his subject being "The G.W.R. in Cornwall."

* * *

DURING 1918 the railways of the United Kingdom had a very creditable record in the matter of railway accidents, a record that is, really, most remarkable when the conditions under which the men have to work are considered. During the past year there was, except the collision of June 15 at Aberdeen, where a boy was killed, only the fatal derailment at Little Salkeld on the Midland, which occurred on January 19, and in which seven passengers lost their lives. This was caused

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by a landslip as a result of excessive moisture, due more to natural causes than to any human agency. This record must be taken along with that for 1917, when there was only one fatal passenger train accident—that at Ratho on January 3, causing 12 deaths—and that for 1916, when, whilst there were three accidents, one passenger only was killed in each. The year 1915 was a very bad one. It opened with Ilford and, practically, closed with Jarrow, and had Kinsale, Smithy Bridge, Quintinshill and Weedon also. Now that hostilities have ceased the facts for the actual fighting period may have judgment passed upon them, and, it is safe to say that in not one of the accidents named did war conditions have any influence on the actual cause. It may be added that neither in France nor the United States of America has there been the same freedom from accident.

* * *

ON January 1 a serious fire, which began about 9 p.m., destroyed the Great Eastern Railway warehouses at Bethnal Green. The seat of the fire was one of the great granaries. It started in what is known as the flour mill. From here it spread to a building of five floors 150 ft. by 120 ft. and stocked with grain, flour, butter, margarine, and tea. Floor after floor collapsed in rapid succession and the flames roared through a hundred windows.

A RAILWAY MAGAZINE reader, Mr. E. J. Dorey, writing from France, remarks:—

"A few weeks ago I was at a certain passing place on a single line of railway out here and saw a train made up of about twenty trucks and five engines. The leading engine was one of the standard G.C.R. type 2-8-0 engines, with about twelve or fourteen trucks, then came three more engines, a N.E.R. 0-8-0, an American type 4-6-0, and one of Kirtley's outside-framed M.R. goods engines, then five or six more trucks, and, finally, another 2-8-0 engine of the same class as the leading engine.

"They were no doubt coupled up together in this manner to facilitate the single line working, as they arrived there in four separate lots, while the first section was awaiting the arrival of an ambulance train from the opposite direction. Of course, things are different here, and one expects to find departures from the normal, but I should think the above would take some beating."

* * *

FROM Mr. S. T. T. Geary comes the following items of locomotive news:—

London and North-Western Railway.—All the 0-8-0 S./H. Goods ordered for 1918 are now running—the last four being numbered as follows: 279, 1,158, 1,359, 2,497. Of these Nos. 279, 2,497 are at Shed 7 (Colwick), whilst Nos. 1,158, 1,359 are not yet allocated.

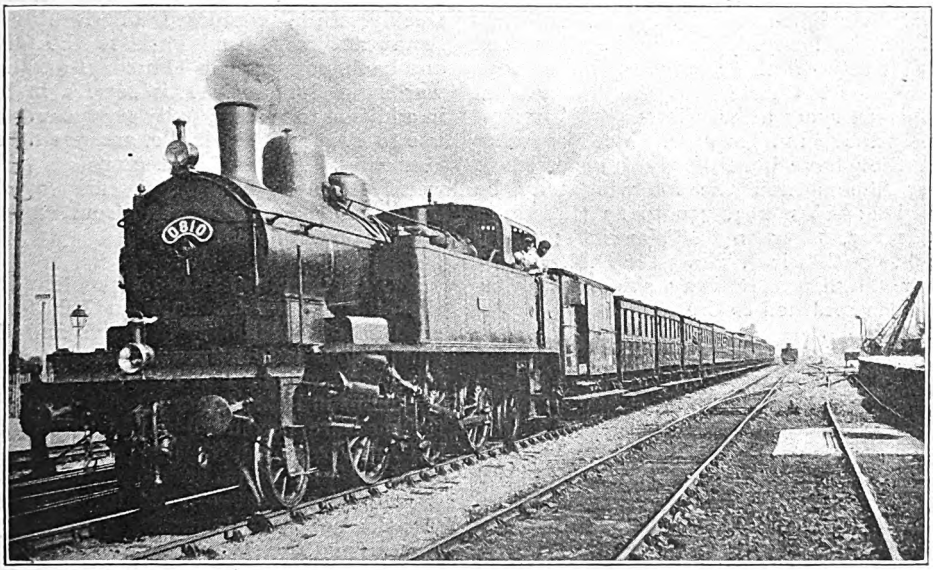

Photo.] FRENCH STATE (WESTERN) RAILWAYS. [*W. H C. Kelland.*

2-6-2 Compound Tank Engine on local train approaching Poissy.

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The numbers are those recently belonging to shunting tanks, now numbered respectively 3,602, 3,603, 3,604, 3,605; 410, a 4-cylinder compound coal engine, has been simplified and super-heated, and is temporarily working at Crewe. Nos. 1,487, 1,261—shown in the last November RAILWAY MAGAZINE—are now allocated to 31 Shed (Abergavenny). Further cut up's include No. 3,426, coal engine, and No. 3,440 D.X. Two 0.6-0 coal engines have recently been returned to Crewe from overseas, for repairs—*ie.*, Nos. 2,049, 3,345. The latter has arrived bearing Yuletide greetings from men in France to the men at Crewe, painted in large letters on smoke box door—and other available places. The total output of new locomotives from Crewe during 1918 was 50—all of the eight-coupled superheater goods variety. Incidentally, it may be mentioned that many of these engines have been stationed at Chester for Admiralty coal traffic—carrying a large letter "A' immediately above number plate. Since November last, they have been slowly transferred to other depots—and the following may be recorded:—Nos. 264, 750 to 27 (Preston); 107, 1,107, 1,435 to 8*w* (Warwick); 1,495, 2,066 to 7 (Colwick). No. 3,166 D.X., loaned to the Highland Railway since 1915, has just been returned to Crewe.

Midland Railway.—The highest numbered superheated goods seen, to date, is 3,879.

Lancashire and Yorkshire Railway.—Five more engines of the six-coupled non-superheated type have been put into service, and are numbered 1,599–1,603 (inc.). This completes the batch of ten—of which No. 919 was the first—although these first five belong to 1917 engines.

Great Central Railway.—Engines of the improved 2-8-0 pattern are now numbered 214–415, 417–419 (inc.); 416 is a new 4-6-0 type of locomotive, with 5-ft. 8-in. wheels intended for express fish traffic. The sequence of numbering of the 2-8-0 engines has thus been rudely interrupted by this engine.

* * *

MAJOR DAVID DAVIES, M.P., Chairman of the Cambrian Railways, Deputy-Chairman of the Barry Railway, Director of the Brecon and Merthyr Tydfil Junction, Vale of Glamorgan, and Welshpool and Llanfair Light Railways, has accepted the Presidency of the Railway Benevolent Institution for the current year in succession to H.R.H. the Prince of Wales, K.G.

ARRANGEMENTS are reported in progress for the clearing of the blocked railway between Dover and Folkestone. A light railway connection is proposed pending the settlement of the question whether there is danger of further subsidence of the cliffs.

* * *

THE Great Central Railway has decided to proceed with the rebuilding of the Grimsby Fish Market at a cost of £140,000. The new market is to be on the site of the old one, which is over a mile long. The work is to be done in ferro-concrete with steel lacings, and will give modern accommodation to the growing requirements of the trade.

* * *

THE International Sleeping Car Company, from January 16, has been running a special weekly train, composed of sleeping and restaurant cars, from Paris to the Riviera and back, outwards on Thursdays and homewards on Sundays. This service is to be in addition to the two daily services running, one to Nice and Vintimille, and the other to Marseilles. An early resumption of the weekly Bombay Express, to carry overland Indian mail passengers to and from Marseilles, is also contemplated.

* * *

A PARLIAMENTARY Correspondent states that the British Government Bill for the creation of a Ministry of Ways and Communications is in a forward state of preparation, and will be laid before the House of Commons in February or March. As soon as the measure becomes law Sir Eric Geddes, M.P. will be appointed head of the department by way of preliminary to the introduction of a great scheme for the nationalisation of the railways, the transport services and the electrical industry.

* * *

IT is understood that the London and North-Western Railway is having four express passenger steamers constructed for the Holyhead, Kingstown, and North Wall services. The order for these steamers was placed a couple of years ago, but on account of the amount of war work in the hands of the shipbuilders their construction was delayed. It is thought that, should nothing unforeseen occur, two of the vessels will be ready for service in a couple of months, and the remaining two as soon as possible afterwards. The steamers will be the largest ever constructed for the Irish trade, will be turbine-driven, with a high speed, and will be able to perform the passage in a very short time. They are being built by Messrs. Denny, of Dumbarton.

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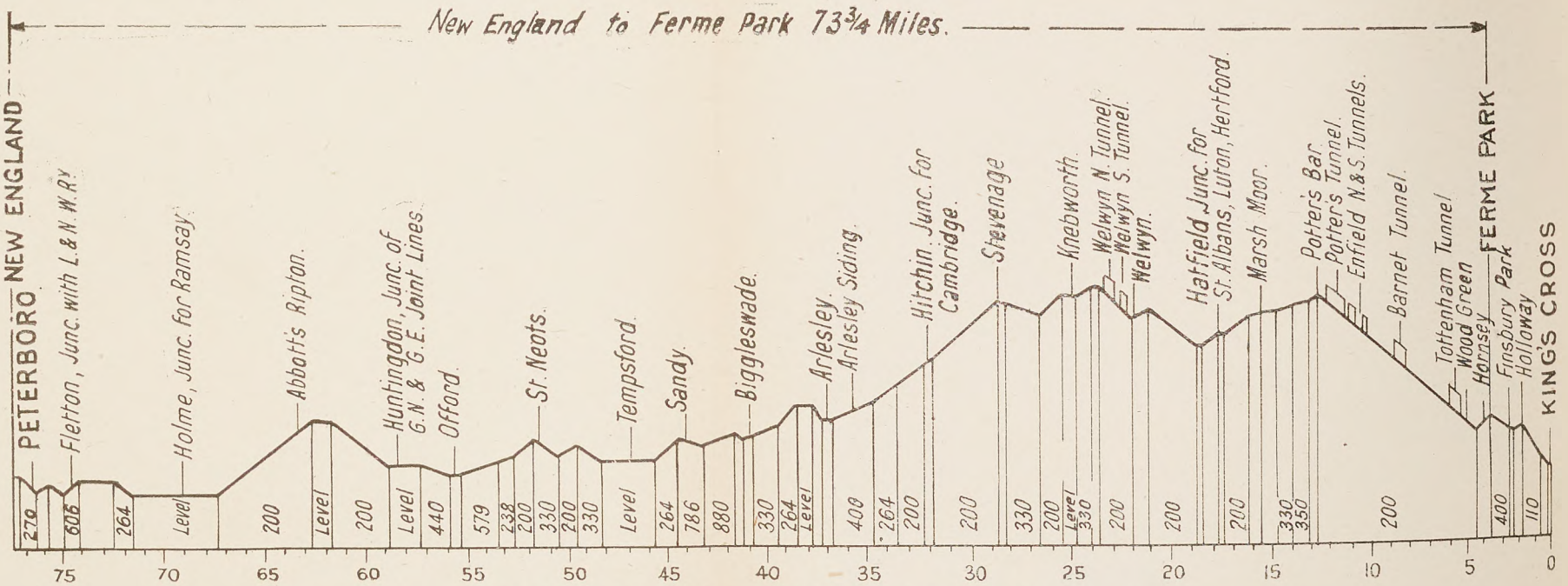
New England to Ferme Park 73¾ Miles.
NEW ENGLAND
PETERBORO
Fletton, Junc. with L. & N. W. Ry.
Holme, Junc. for Ramsay.
Abbotts Ripton.
Huntingdon, Junc. of G.N. & G.E. Joint Lines.
Offord.
St. Neots.
Tempsford.
Sandy.
Biggleswade.
Arlesley.
Arlesley Siding.
Hitchin, Junc. for Cambridge.
Stevenage
Knebworth.
Welwyn N. Tunnel.
Welwyn S. Tunnel.
Welwyn.
Hatfield Junc. for St. Albans, Luton, Hertford.
Marsh Moor.
Potters Bar.
Potters Tunnel.
Enfield N. & S. Tunnels.
Barnet Tunnel.
Tottenham Tunnel
Wood Green
Hornsey
Finsbury Park
Holloway
KING'S CROSS
FERME PARK
270 606 264 Level 200 Level 200 Level 440 579 238 200 330 200 330 Level 264 786 880 330 264 Level 409 264 200 200 330 200 Level 330 200 200 200 330 350 200 400 110
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

Profile of Main Line between New England and Ferme Park (Hornsey).

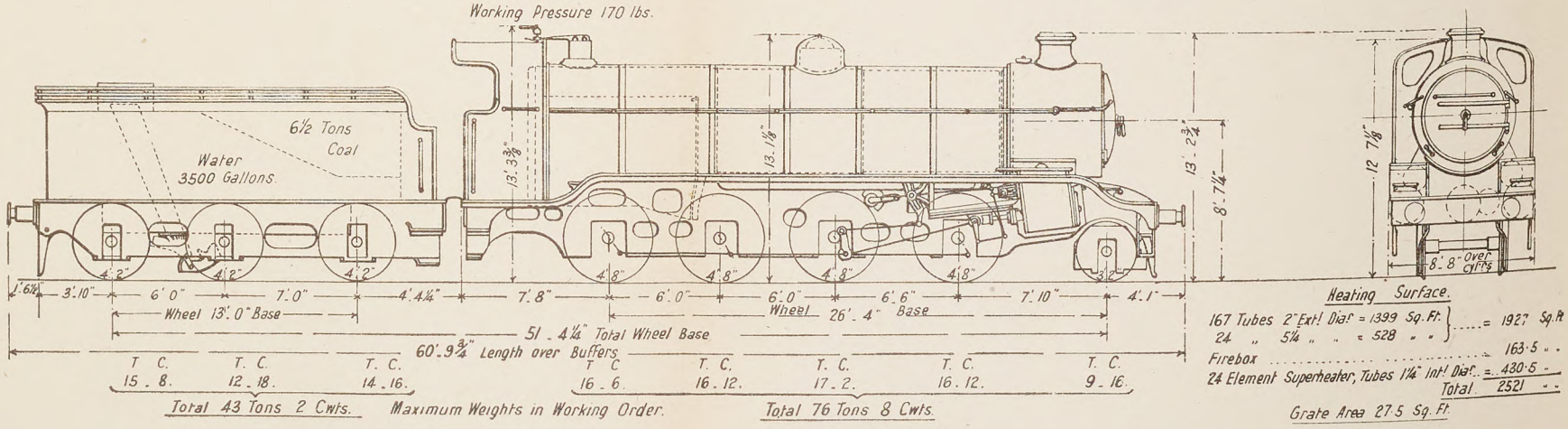

Diagram of 3-Cylinder Coal Engine No. 461.

A GREAT NORTHERN RAILWAY LOCOMOTIVE AND THE GRADIENTS IT CLIMBS HAULING A 1,300-TON COAL TRAIN.

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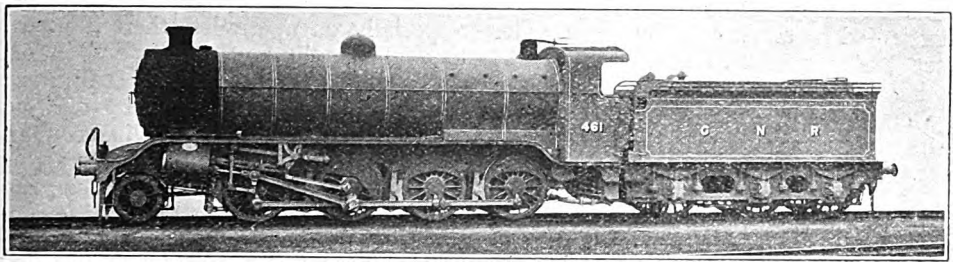

GREAT NORTHERN RAILWAY NEW 3-CYLINDER COAL ENGINE, No. 461.

Great Northern Railway Three-Cylinder Engine, No. 461.

A TEST OF ITS PERFORMANCE WITH A 1,300 TON COAL TRAIN.

By CHAS. S. LAKE, A.M.I.Mech.E., M.Inst.L.E.

IN the January issue of the *Railway Magazine* there appeared a coloured frontispiece showing the three-cylinder 2-8-0 type coal engine, No. 461, of the Great Northern Railway, and readers of this periodical are doubtless fully acquainted with the fact that this engine is as yet the only one of its class, also that it is employed in working coal trains between Peterborough and London, taking loaded trains in the up direction and bringing back empties for the collieries.

The writer was privileged to make a trip on the footplate of this locomotive recently from New England, Peterborough, to Ferme Park, Hornsey, which latter point marks the terminus for Great Northern Railway mineral traffic so far as through main line haulage is concerned. The trains worked by No. 461 are loaded in the up-direction only, and they are made up of 80 10-ton wagons or their equivalent, the total weight behind the engine, including the 20-ton brake, being about 1,300 tons. The engine has shown itself capable of successfully handling loads in excess of this under favourable conditions of weather and rails.

In handling mineral traffic it is difficult, if not impossible, under most circumstances, to ensure a continuously clear run for any train on any of the sections, although, as a matter of fact, it frequently happens that a coal train booked on a through schedule between the starting and finishing points runs without obstruction for considerable distances at a time. Having regard to the average speeds of such trains, the actual distance run without a stop or check of any kind must be judged on quite a different basis to that of passenger trains. The regularised stops for locomotive purposes, examination of the train, and so forth, are at any time likely to be protracted by circumstances, such, for instance, as detaching crippled wagons, which are not directly concerned with the working of the mineral train itself. As a matter of fact, during the trip made by the writer there were several stops, some of them of fairly long duration to allow of other trains passing in the same direction. The journey occupied about 6¾ hours for the distance of 74 odd miles, but the actual running time was considerably less than this, being not more than 4½ hours all told.

The writer's experience on the footplate of the No. 461 engine confirmed what was already known to be the case, namely, that a long and very heavy unbraked train, comprised of vehicles fitted with ordinary chain link couplings, represents something very different—where the handling of the locomotive is concerned—from a similar or much smaller load in which every vehicle

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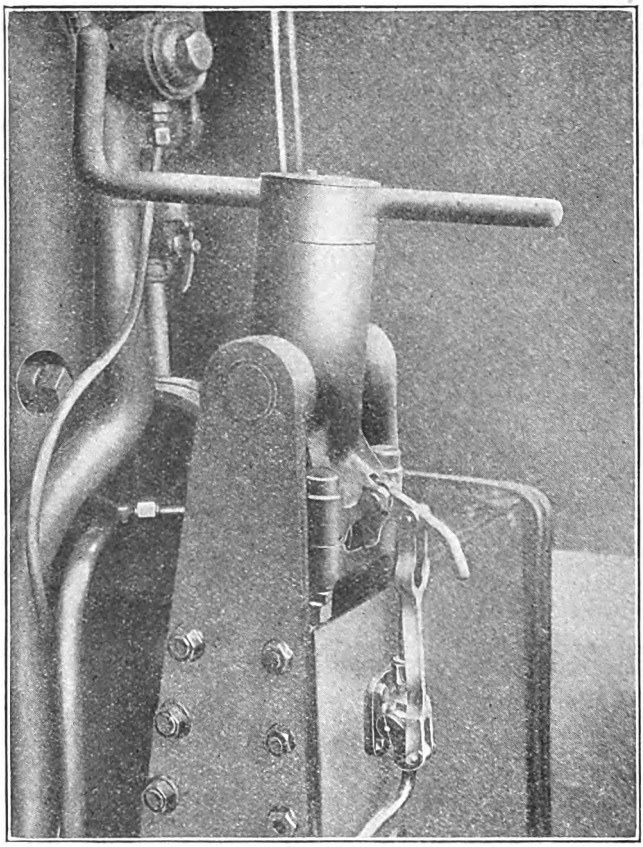
is connected by screw couplings and under direct brake control. The influence of the heavy train over the locomotive is very clearly felt, and particularly so at points where abrupt changes of grade occur. The tendency is for the train to pull or push against the engine, and the driver must therefore, in manipulating the regulator, keep both the couplings and the brake power in mind when increasing or reducing speed.



REVERSING GEAR MECHANISM IN CAB.

In the case of trains such as those worked in turn by the three-cylinder engine referred to on the present occasion, and others of the two-cylinder 2-8-0 and other classes, it must frequently happen that of the total number of wheels comprised in the make-up of the train, including the engine, only 11 pairs, or about 12 per cent. of the whole, are braked, and of the brake power available a material proportion is applied by hand. At starting, especially on up-grades, there is need for careful handling of the engine in order that too sudden a strain shall not be thrown upon any part of the draw-gear, and particularly the chain link couplings. On this score the three-cylinder arrangement, with cranks set at 120 deg., represents a very noticeable improvement upon that having two cylinders at 90 deg., and one impression resulting from the trip on engine No. 461 was the outstanding excellence of the performance in this respect. The engine had some very difficult starts to contend with, but in every case it got away with its big load from a state of rest in a clean and steady fashion, working up to speed uniformly and without the jerking so noticeable and often impossible to avoid when a two-cylinder engine is employed. This, of course, refers to movements effected from a standstill. It is impossible with any

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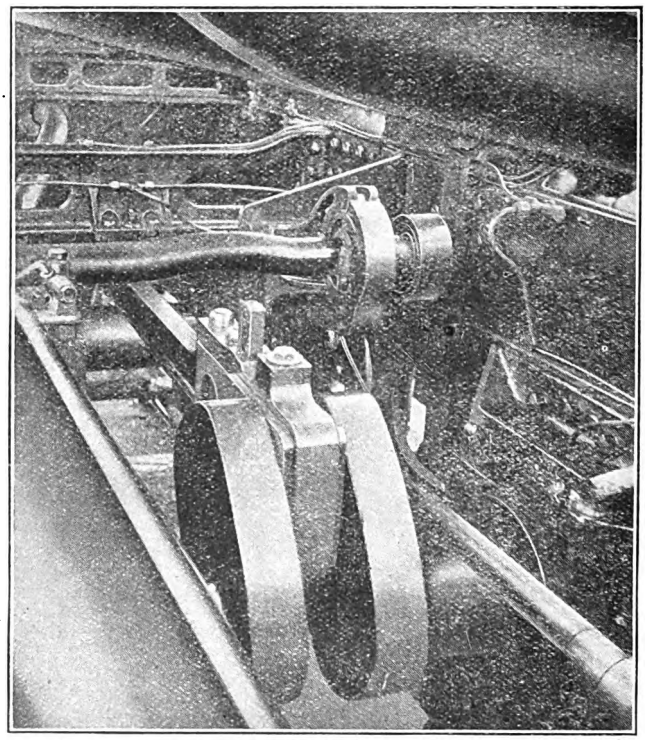
engine to avoid jerking of the couplings at times when the grade and the speed abruptly change, and it is here that the influence of the train over the engine previously referred to makes itself felt. On some of the down grades it was necessary to get the engine well in hand because of uncertainty as to whether a clear run would ensue over the section ahead, and on being checked by signal the push of the train behind the engine,



VIEW UNDERNEATH THE BOILER OF G.N.R. 3-CYLINDER ENGINE SHOWING MOTION OF INSIDE CYLINDER.

directly steam was shut off, at once became very noticeable.

The trip was made on a fine but windy day with a full load, starting from Peterborough yards with a train made up as follows :—

Engine and tender, 119 tons, 10 cwts.
Twenty-three N.E.R. 20-ton hopper wagons (Durham to London coal traffic).
Two 12-ton wagons.
Thirty-two 10-ton wagons.
One 20-ton brake (six wheels).

The train thus consisted of 57 loaded wagons, equal to 80 averaging 10 tons each, with the 20-ton brake in addition, or 125 pairs of wheels in all. This represented a gross load, according to official reckoning, of 1,300 tons behind the engine, the net or "paying" load being comprised of about 800 tons of coal. The order in which the vehicles are given above is the one in which they were marshalled on the train, counting from the engine. It will thus be seen that the heavier vehicles, constituting about 46 per cent. of the total number, were next to the engine, and this is found to be of advantage in the working of the latter. The heavier units are sometimes assembled at the rear of the train, in which position they "drag" much more heavily on up grades, and alternatively appear to exert a greater pushing effect on the locomotive when steam has been shut off prior to stopping, and particularly when coasting on long down grades. It not infrequently happens that the trains are made up of 80 individual wagons or 160 pairs of wheels, exclusive of the engine and brake.

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Although this does not affect the actual load to be hauled, it does necessarily lead to an increase of resistance due to added flange pressure.

The grades are moderate until reaching the 67th milepost from London, where there is a continuous climb of between 4 to 5 miles to beyond Abbotts Ripton. A good test was here afforded of gauging the hill-climbing capacity of the engine, owing to the train being heavily checked near the foot of the bank. No. 461 was fully master of its train on this climb of 1 in 200 and accelerated its speed somewhat on the way up, the regulator being about half-way open and the valves cutting off at 60 per cent. of the stroke in all three cylinders. The average-cut-off for the trip was 47 per cent., and indeed it was only infrequently that the driver exceeded this figure. At starting the pointer was as a rule set to represent 60 or 65 per cent. cut-off, according to the circumstances of the moment, the full load being then easily moved without distressing the engine in the least. Other tests of the hauling capacity of the locomotive were provided by the climbing of the Woodwalton Bank, and the long rise from Arlesley to Stevenage with intermediate stops, including one of some duration at Hitchin for water and train examination. The final portion of this grade, namely, from Cadwell to Stevenage, a distance of about 5 miles, is graded at 1 in 200. Some more climbing occurred at a later stage, namely, from Hatfield to Potter's Bar, a grade of 200 giving way to others of 1 in 330 and 1 in 350 on approaching the summit at the last-named point. The engine showed to great advantage on each of these occasions in spite of being checked or stopped altogether at various points.

The fact of there being three cylinders in place of two, and consequently six exhausts instead of four for every complete revolution of the coupled wheels, creates, until one gets used to it, a somewhat false impression, namely, that the engine is working harder than really is the case. When the trip was taken Mr. Gresley was trying a new piston valve on the inside cylinder, without any trick port, and this appeared to cause a decided difference in the beat, so that it was an easy matter to distinguish when the inside cylinder was exhausting as distinct from

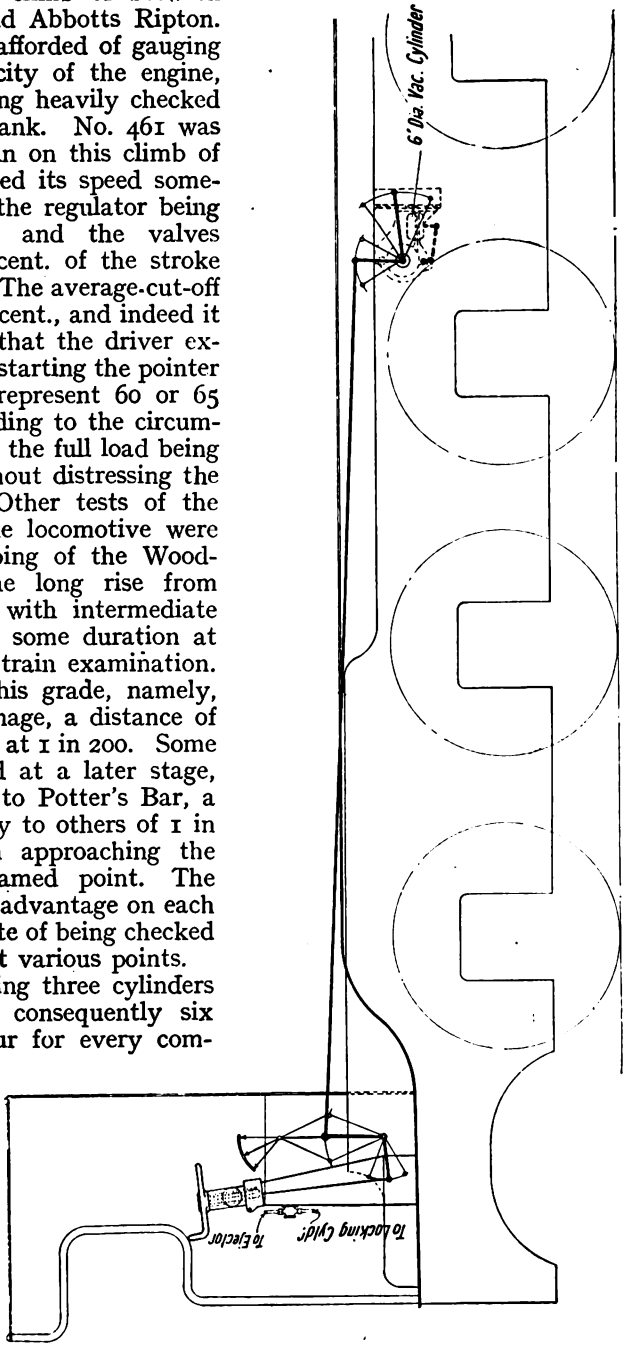

DIAGRAM SHOWING ARRANGEMENT OF REVERSING GEAR FOR 3-CYLINDERS.

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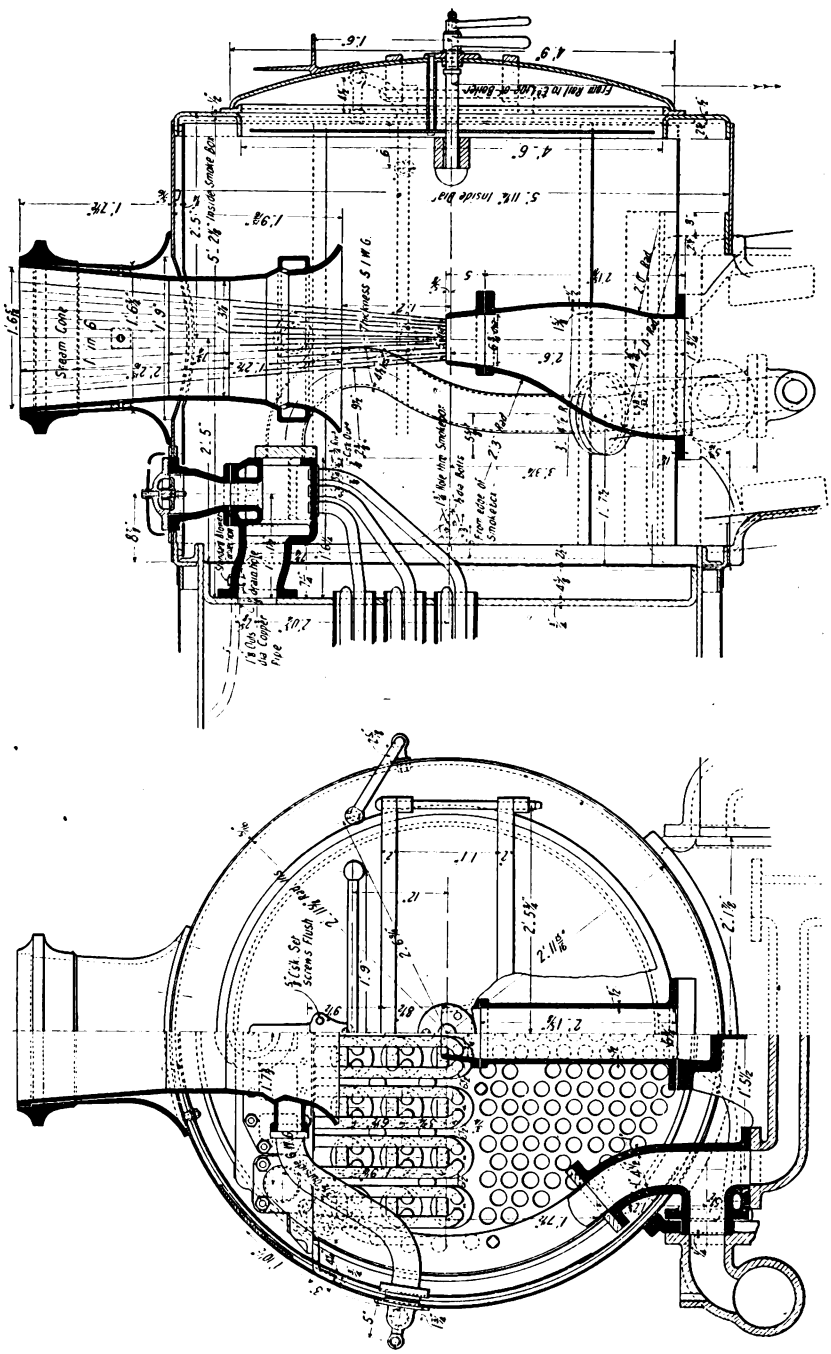

CROSS AND LONGITUDINAL SECTIONS THROUGH SMOKEBOX OF G.N.R. 3-CYLINDER COAL ENGINE No. 461.

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the others. Apart from this, one of the principal and most impressive factors in the working of the engine was the uniform manner in which the three cylinders did their work. The alternate thrusts of the outside pistons, which form such a noticeable feature in a two-cylinder locomotive of large power, are neutralised to a very great extent in this case by the action of the third or inside cylinder, the result being seen in the almost entire elimination both of "shouldering" at the front end and the tendency to lift under any conditions of track or speed.

sighting a signal some distance ahead, it is seen to be adverse. Much fuel and steam are wasted by indiscriminate firing on sections where trains of this description are likely to be held by signal for the passing of other traffic on divergent tracks, and it was noticed that, throughout the trip, the fireman's efforts were influenced to a large extent by the signals and the alternative chances of getting a clear run or being checked, as the case might be.

The safety valves on this engine are nominally set to blow off at 170 lb. per sq. in., but they lifted at 165 lb., which

TABLE OF VALVE SETTING.

2-8-0 TYPE ENGINE No 461.

8" Piston Valve, 1¼" Lap. – 5/16" Exhaust Lap.

Three Cylinders, 18" Diameter x 26" Stroke.

	FORWARD GEAR.													
	OUTSIDE CYLINDERS.								INSIDE CYLINDER.					
MEAN CUT OFF	TRAVEL OF VALVE	LEAD F.	LEAD B.	VALVE OPENING F.	VALVE OPENING B.	CUT OFF % F.	CUT OFF % B.		TRAVEL OF VALVE	LEAD F.	LEAD B.	VALVE OPENING F.	VALVE OPENING B.	CUT OFF % F.	CUT OFF % B.
15%	2 7/8"	1/8"+1/64"	1/8"+1/64"	3/16" B	3/16" F	15·5	16·3		2 7/8"	1/8"	1/8" B.	3/16"	3/16"	18	16·1
30%	3 5/32"	1/8"+1/64"	1/8"+1/64"	5/16"	11/32"	28·6	31·9		3 5/32"+1/64"	1/8"+1/64"	1/8" F.	5/16"	11/32"+1/64"	32·2	29·8
45%	3 1/2"+1/64"	1/8"+1/64" F	1/8"+1/64" F	7/16"+1/64"	9/16" B.	45·4	45·4		3 9/16"	5/32"	5/32"	1/2"	9/16"	44·9	42·3
60%	4 3/16"	1/8" F	5/32"	3/4"	15/16"	62	58·8		4 3/16"	5/32" B	5/32"	13/16"	7/8"	61	56·4
FULL GEAR.	5 1/2"+1/64"	1/8"+1/64"	1/8"+1/64"	1 3/8"	1 5/8"+1/64"	78·8	74·3		5 3/8"+1/32"	1/8" F.	1/8" B.	1 3/8"+1/32"	1 1/2" B.	78·8	73·2
	BACKWARD GEAR.													
15%	2 29/32"	1/8"+1/64"	5/32"	3/16"	7/32" F	15·1	15·6		2 7/8"	1/8"	3/32"	3/16" F.	3/16"	20·9	18·2
30%	3 3/32"+1/64"	1/8"	1/8"+1/64"	1/4"+1/64"	11/32"	28·1	30		3 1/4"–1/64"	1/8"	1/8" B.	3/8"–1/64"	3/8	32·6	30
45%	3 1/2"	1/8"+1/64" F	1/8"+1/64" F	15/32"	17/32"	44·4	45·4		3 5/8"	3/32"	1/8"	1/2"	5/8"	46·1	44·7
60%	4 1/8"	1/8"+1/64"	1/8"+1/64" F	3/4" F.	7/8"	61·5	58·6		4 3/16"	1/32"	3/64"	13/16"	7/8"	60	58·1
FULL GEAR	5 11/32"	1/8"+1/64"	1/8"+1/64"	1 3/8"	1 15/32"	78·6	73·8		5 11/32"	1/16" BLIND	3/64"	1 3/8"	1 15/32"	77·4	76

VALVE MOVEMENTS OF G.N.R. 3-CYLINDER ENGINE No. 461.

On no occasion was any difficulty experienced in maintaining a full head of steam. The fireman performed his part of the work with great skill, maintaining a fairly light but even fire over the whole of the grate. Such a system, of course means more frequent replenishments of the fuel in the fire-box, and indeed, whilst the train was in motion, the shovel was never out of his hands for long at a time. On a trip of this sort it is customary in some cases to "fire by the signals," that is to say, let the signals form a guide, and wherever possible arrange matters so that making up of the fire is postponed if, on

figure was worked to and seldom exceeded. As an average the pressure-gauge needle was steady at 163 lb., the valves just simmering for the major part of the journey. The blast pipe nozzle is 5 in. diam. inside, and it stands at a height of 2 ft. 6⅝ in., which brings the nozzle just slightly above the centre line of the tube-plate. The steam and exhaust pipe arrangement is shown in one of the accompanying drawings, which also gives a general view of the smoke-box, with superheater header and front tubeplate. This drawing also shows the "steam cone," or course taken by the steam in passing from

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the blast pipe to the atmosphere. The diameter of the chimney at the top is 1 ft. 6$\frac{5}{16}$ in., tapering to 1 ft. 3$\frac{1}{8}$ in. for a depth of 7$\frac{3}{4}$ in. parallel. As the drawing shows, the steam in passing out of the chimney has a clear space of about 1 in. round it, that is to say, it clears the tapered walls of the chimney by that amount at the outlet. It may be remarked that the diameter of the blast pipe, viz., 5 in., is on the small side, but it must be remembered that in this design there are three cylinders and six exhausts per revolution, affording ample draught on the fire.

The footplate arrangements on engine 461 leave little or nothing to be desired, and the neat and efficient reversing gear arrangement is particularly striking. Reversing is effected with the greatest ease and nicety of setting, this being largely due to the fact that a ball-bearing is included in the mechanism. By Mr. Gresley's courtesy there is reproduced herewith a drawing of the reversing gear in which, as shown, ball-bearings are used to take up the thrust and reduce the friction when operating the nut. The gear is locked by means of a rocking lever which engages the slots cut in the flange round the nut, and to this lever is attached a connection for operating the vacuum lock on the reversing shaft. When the lever is lifted in order to release the lock on the nut, it automatically releases the vacuum lock on the reversing shaft.

For the most part the trip was made by the use of what is termed the "1st regulator," which means any point up to and including half-way open, whilst from there on to full open is referred to as the "2nd regulator." Average conditions for the journey were half (or 1st) regulator and 47 per cent. steam cut-off in the cylinders. On the Woodwalton Bank, which starts with a curve, the driver was cutting off at 50 per cent., and with this the engine kept the train moving in good style throughout, although the steam pressure dropped to 140 lb. on this section, the lowest point reached anywhere on the journey.

Many of the coal and mineral trains running between Peterborough and London habitually stop at Cambridge Junction, Hitchin, for water or traffic purposes. This involves a very heavy re-start, the grade being here 1 in 200, whilst the task is rendered still harder by the fact that the engine has to face a reverse curve immediately after starting. Considerable slipping occurs at this point when the rails are at all greasy, and that brings to mind the only criticism the writer has to offer as to the equipment of the No. 461 engine. As at present running it appears to be deficient in sanding power, being fitted with only one pair of sand pipes, namely, those in front of the driving wheels of the outside cylinders, the sand being applied by steam. There are gravity-fed sand pipes at the rear of the trailing wheels, but these, of course, do not assist when running in a forward direction. In preferring this small criticism, the writer is, of course, mindful of the fact that a three-cylinder engine does not require such an efficient sanding apparatus as a two-cylinder one, owing to its much more equal torque; but in view of the very heavy loads taken by this locomotive and the difficulties it has regularly to overcome at several points of the trip when, as so often occurs, the weather and rail conditions are adverse, it would certainly be an improvement if the leading coupled wheels were also provided with front sanding apparatus.

The journey commenced at about 11.30 a.m., which, as the writer was informed, is an awkward time for the train to leave Peterborough, for the reason that from then on for a period of two or three hours the traffic on the up main line is rather heavy. This was fully borne out on the occasion referred to, the train hauled by No. 461 being stopped at several points to allow of passenger and other trains running on fast schedules to pass on sections consisting of two through tracks only. Delays of this sort, of course, react unfavourably upon a locomotive with a heavy loading. For one thing, it is impossible to maintain the temperature of the superheat, whilst the recurrence of starting entails a greater and more repeated effort than is required in keeping the train moving continuously for long periods at a stretch. In spite of this, however, there were many clear runs of several miles on end, as, for instance, from Huntingdon to Sandy, a distance of 15 miles, performed in 40 minutes—an average speed of 22·5 miles per hour—whilst the run from Huntingdon to Hitchin,

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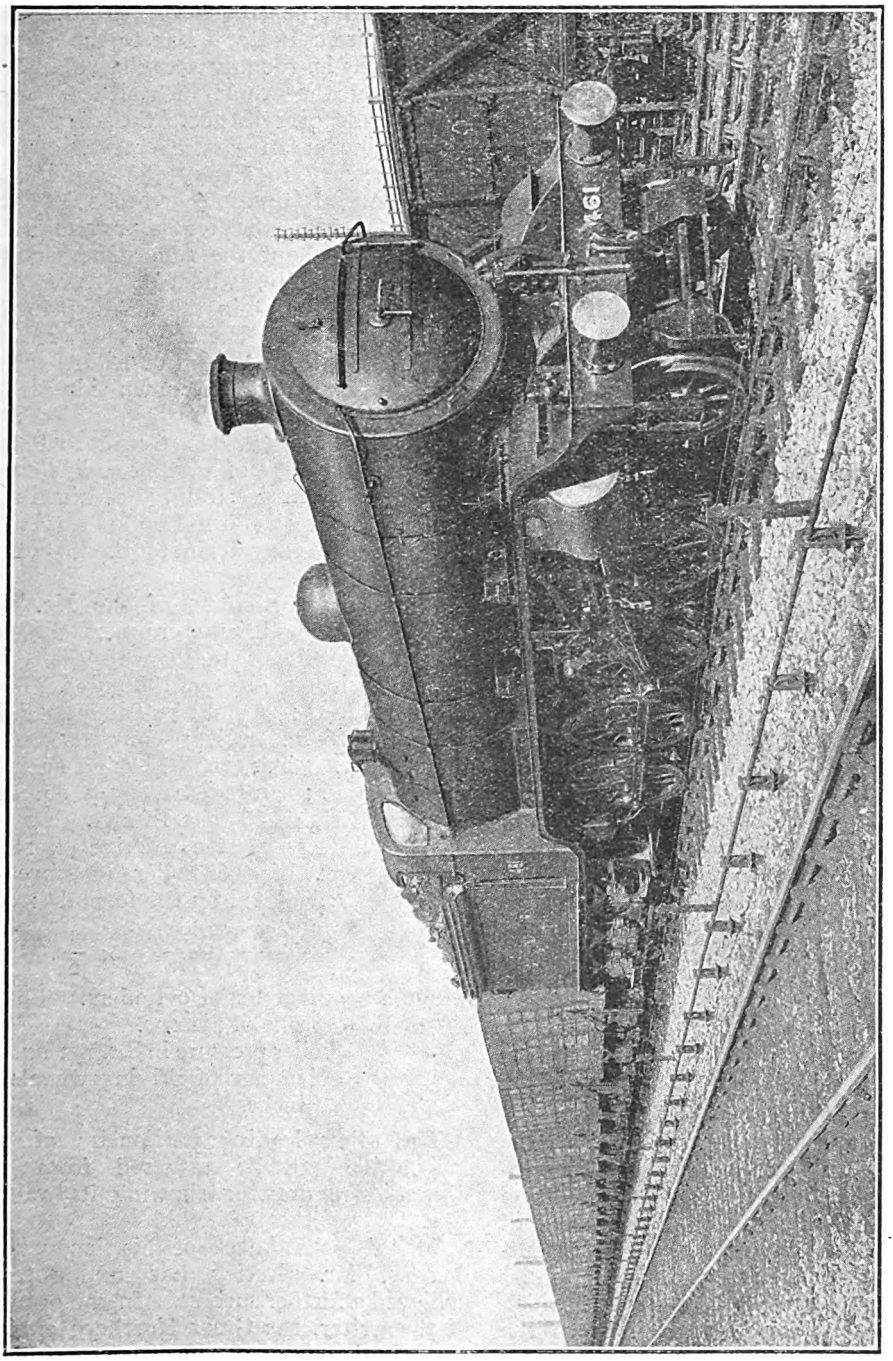

THE 3-CYLINDER COAL ENGINE No. 461, WITH 1,300-TON TRAIN EN ROUTE FROM PETERBOROUGH TO LONDON.
This Locomotive is fitted with the Wakefield Lubricator for valves, cylinders and axleboxes, and also with the Wakefield Patent Anti-Carboniser.

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27 miles, was made in 1½ hours, including several stops, one of which comprised a wait of 20 minutes, due to the passing of a duplicated express passenger train, followed by an ambulance train. The engine, when being turned off the main line or at junctions, took the facing points in excellent style, even when running at the higher speeds, this, of course, being due to the action of the very flexible and well-designed "pony" truck at the leading end. The whole of the work in every circumstance was performed without fuss on the part of the engine, which latter possesses a wide range of flexibility and is one of the steadiest and most comfortable engines it has ever been the writer's privilege to ride upon. There is no difficulty on the part of the boiler to fill the cylinders under the most exacting conditions of working, and, similarly, as was very clearly shown during the trip, the cylinders easily get rid of the exhaust steam even when cutting off late It was estimated that about 3 tons of coal were consumed on the trip from New England to London (Hornsey), a distance, roughly speaking, of 74 miles, this representing an average of about 92 lb. per mile. The coal consumption from the date on which the engine was placed in service (May, 1918) until November 30 works out at 89·9 lb. per mile. The mileage worked during the period in question was 19,619. Firing, as before metioned, was frequent and averaged nine shovelfuls each time. A good medium class of coal was burned, and water was taken at two points, namely, Huntingdon and Hitchin. The enginemen appeared enthusiastic on the subject of their engine, and they had a particularly good word for two features of its equipment, namely, the Wakefield mechanical lubricators, applied to the driving axleboxes, as well as to the cylinders and steam chests, and also the Davies and Metcalfe exhaust steam injector. A good outlook is afforded from the cab windows, and there is plenty of room in which to move about on the footplate, ample width being afforded, whilst at the same time the distance over which coal has to be shovelled as between the tender and the firedoor is kept moderately short.

The last shovelful of coal was put in the firebox just before reaching the summit at Potter's Bar, at which point also the hand brake on the tender was screwed on hard, and the regulator closed. The distance from Potter's Bar to the Ferme Park yards is, roughly speaking, 8½ miles, practically the whole of which is on a down grade of 1 in 200. Coasting down this incline at an easy average speed, it was necessary to steady the engine and train several times by means of the vacuum brake, the regulator remaining closed throughout the run. On reaching Hornsey the fire, whilst low, was still sufficient to maintain the steam pressure at about 130 lbs. The engine, after completing its trip in the up or loaded direction, crosses over to the down side of the main line, where it is turned, coaled and watered, and afterwards returns to Peterborough, in charge of another engine crew, with a coal empties train, the driver and fireman who worked it to London travelling back by passenger train to the depot at New England.

The main particulars of the No. 461 engine may be briefly enumerated here for the benefit of those who desire to refresh their memories on the point. They are as follows:—Cylinders (three), 18 in. diam. by 26 in. stroke; coupled wheels, diam., 4 ft. 8 in.; total heating surface, 2,521 sq. ft.; grate area, 27·5 sq. ft.; adhesion weight, 66 tons 12 cwt.

The cylinders exert a tractive effort at 85 per cent. of the boiler pressure of 32,605 lb., calculated by the formula:—

$$T = \frac{d^2 \times S \times p \times \cdot 85}{D} \times \frac{3}{2},$$

where d = diameter of cylinders.
S = stroke of pistons.
p = boiler pressure in lbs. per sq. in.
D = diameter of driving wheels in inches.

The other leading particulars of the locomotive can be gathered from the dimensioned drawing showing it in outline.

In this, the latest of his locomotive designs, Mr. Gresley has undoubtedly achieved a further success. In the opinion of the writer, the Great Northern engine, No. 461, is one of the most successful yet introduced in heavy coal train working on British railways.

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The Corris Railway.

By H. L. HOPWOOD.

AMONG numerous narrow - gauge railways in Wales, one of the best known to tourists is the Corris Railway, providing, as it does, a very popular route from Machynlleth to Cader Idris, Tal-y-llyn Lake, &c.

The history of this railway goes back a good many years. Its original title was the Corris, Machynlleth and River Dovey Tramroad, and by Act of July 12th, 1858, this Company was empowered to construct a horse tramroad connecting certain slate quarries at Aberllefeni and Corris with the River Dovey. The line was so made, to a point on the river Dovey near where Glandyfi station now stands, the gauge being 2 ft. 3 in.

Meanwhile, the Cambrian Railways (Aberystwyth and Welsh Coast section) was gradually being completed towards Aberystwyth, and when the line was opened from Machynlleth to Borth in 1863, the existence of that part of the tramroad below Machynlleth became no longer necessary, as it was found more economical to transfer traffic to the Cambrian Railways than to maintain and work the tramroad down to the river side. Accordingly, by an Act passed in 1864, this portion was abandoned, and Machynlleth was made the southern terminus of the line. By the same Act, the title was altered to that of the "Corris Railway Company," and the employment of locomotives, in place of horses, was authorised. This concession, however, was not taken advantage of until some years later, when, in 1878, three locomotives were delivered. They were put to work in February, 1879, after the track had been relaid with steel rails.

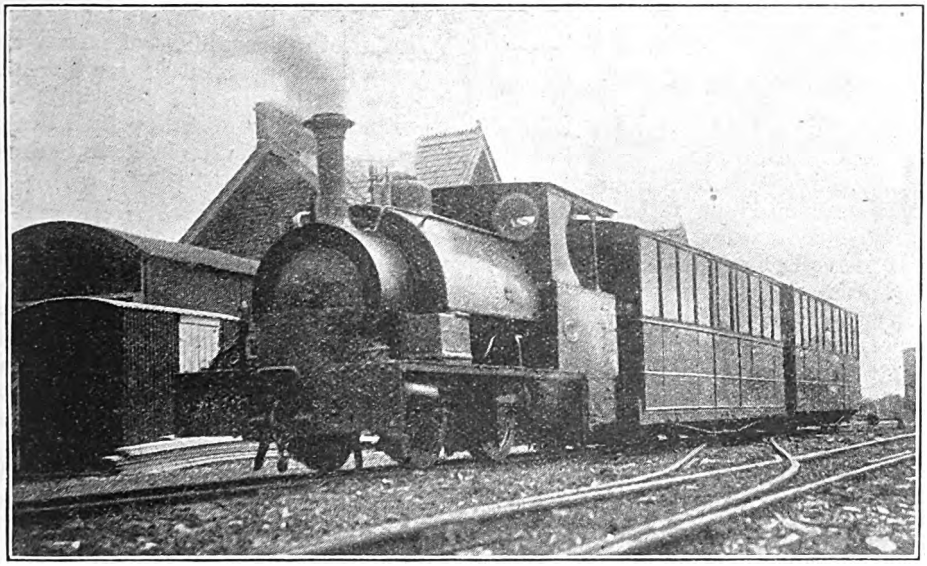

Photo.] CORRIS RAILWAY. [*H. L. Hopwood.*

Train at Machynlleth Station. 0-4-2 Saddle Tank Engine, No. 2.

For many years, the Corris Railway was prohibited from carrying passenger traffic, but there was nothing to prevent passengers being taken by *road*,* and this

* The main road runs parallel with the railway between Machynlleth and Corris.

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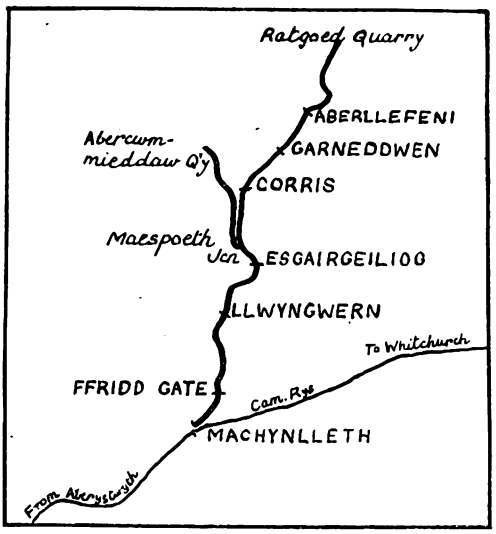

CORRIS RAILWAY MAP.

the Company had been in the habit of doing, until, after many unsuccessful applications to Parliament, an Act was finally passed on June 18th, 1883, sanctioning the conveyance of passengers, as well as minerals, by rail. The Company lost no time in getting to work as a passenger-carrying railway, for passenger trains started running between Machynlleth and Corris on July 4 following. It was not, however, until August 25, 1887, that these trains were extended to Aberllefeni.

At that time, as now, the Corris Railway was a single line system 11 miles in length. The passenger line reaches from Machynlleth to Aberllefeni (6 miles 38 chains) but beyond this station it continues to Ratgoed Slate Quarry for mineral traffic only. Other slate quarries are served by a mineral branch which leaves the main line at Maespoeth Junction, south of Corris.

The railway starts from near the Cambrian station at Machynlleth and very shortly crosses the River Dovey by a fine steel bridge in four spans. A northerly, but rather circuitous, course is then taken along the Dulas valley, the river of that name being in touch with the railway on the right hand all the way up to Aberllefeni; whilst on the opposite side the main road from Machynlleth to Tal-y-llyn is in close proximity as far as Corris.

Corris station boasts an all-over roof, and is thus of a type quite unique on Welsh narrow-gauge railways. This building is illustrated on page 155, and is like a miniature edition of one of Brunel's old Great Western stations. Built solid with the station are sheds used for storing carriages. Corris is the station for Cader Idris and Tal-y-llyn Lake. A favourite circular tour is from, say, Aberystwyth to Machynlleth by Cambrian Railways, and then by the narrow-gauge railway to Corris. There a change is made to a coach for Abergynolwyn, passing Tal-y-llyn Lake on the way (with Cader Idris in the background). From Abergynolwyn to Towyn, the Tal-y-llyn Railway is used, and at Towyn is found a Cambrian train for the return journey to Aberystwyth.

Aberllefeni, the terminus for passenger trains, is of the usual kind of narrow-gauge railway station, as, indeed, are the others, except Corris and Machynlleth, which have better accommodation than the rest.

Going up from Machynlleth, all platforms are on the right-hand side, consequently, coaches have entrances on that side only. Curiously enough, the same practice is applied on the neighbouring Tal-y-llyn Railway, where all platforms are on the left. In connection with this matter, we were once very amused when travelling on the Tal-y-llyn Railway. We noticed the coaches looked very smart in a fresh coat of paint and varnish, but further investigation showed that the new paint was *on one side only*—needless to say, the platform side. Apparently, those responsible had viewed the matter only from the spectacular standpoint, and did not take into consideration the fact that paint and varnish are far more necessary for preserving woodwork than for pleasing the eye of unappreciative passengers.

In addition to the matter of platforms, the Corris and Tal-y-llyn Railways have a further point of similarity between them, i.e., they are the only two railways in the Principality to adopt the 2 ft. 3 in. gauge. In common with most narrow-gauge systems, the Corris Railway has a difficult road to negotiate. Curves are many and sharp, and from Machynlleth the line rises at 1 in 32, 34, 43, 46, 56 and 59.

The three engines now in service are those delivered in 1878, as already mentioned. They are 0-4-2 saddle-tanks

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built by the Falcon Engine Works, Loughborough (now the Brush Electrical Engineering Company). Particulars of them are as follows :—

Number.	Works Number.	Date Rebuilt.
1	324	1895
2	322	1898
3	323	1900

Dimensions :—
Cylinders ... ... 7 in. by 12 in.
Wheels—
L and D ... ... 30 in.
Trailing ... ... 11 in.
Wheelbase—
L to D... ... ... 4 ft. 0 in.
D to T... ... ... 4 ft. 5 in.

Boiler—
Length... ... ... 5 ft. 5½ in.
Diameter ... ... 2 ft. 3⅝ in.
Work. Pressure ... ... 140 lbs.
Heat. Surface... ... ... 156·3 sq. ft.
Grate Area ... ... 3·1 sq. ft.
Weight ... ... 10½ tons.

Engine No. 2, with a train ready to leave Machynlleth is shown on page 153.

There are eight passenger carriages, one brake van and 27 wagons. Most of the slate traffic is carried in private owners' wagons, of which there were at one time probably 150 in use. The carriages are mounted on bogies and have open central gangways (entered from one side only) and these give access to two open compartments on either side. Large windows extend from the waist line to the roof, so as to give good views of the surrounding country.

By the issue of cheap tickets (apart from tourist tickets) and other facilities, the management has done its best to encourage passenger traffic, with the result that—when the mileage and character of the railway are taken into account—this traffic has been considerable. It is well this is so, because the carriage of slates, which in the past has been the mainstay of most narrow-gauge railways in the district, has gradually decreased, owing to foreign competition. This decline is reflected in the dividends of the Corris Railway. At one time, dividends were as high as 8½ per cent., but by 1905 they had dropped to 1 per cent., and since then nothing has been paid.

Previous to the War, slates were actually imported into Wales from abroad—a state of affairs that should never have been allowed to exist. Recently there has been a remarkable revival in many home industries, and it is to be hoped this revival will extend to the slate-quarrying business of Wales, and so bring renewed prosperity to the railways engaged in that traffic.

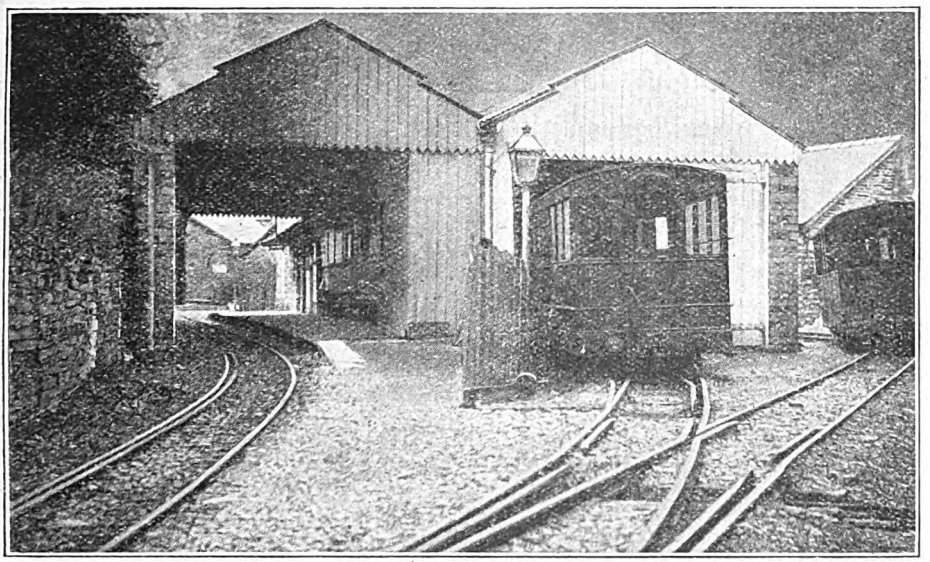

Photo.] CORRIS RAILWAY STATION. [*H. L. Hopwood.*

Main line on left. Carriage sheds on right.

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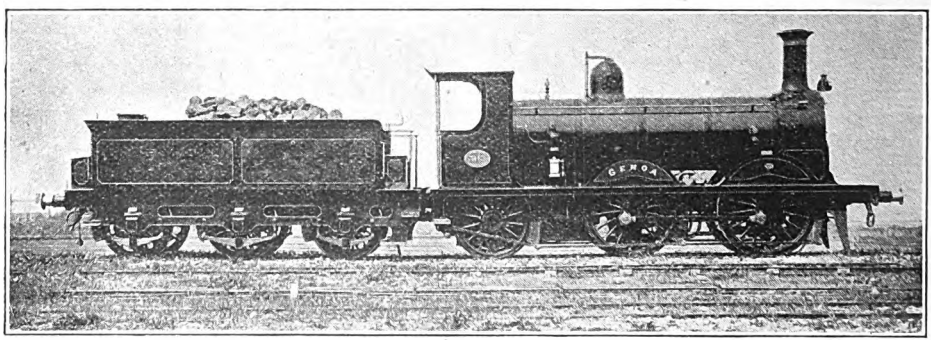
Locomotive and Train Working in the latter part of the 19th Century.

THE LONDON, BRIGHTON & SOUTH COAST RAILWAY. [No. III.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

DEALING with the express train service, the London-Brighton fast runs in 65 min. date back to about 1857. The fastest train, the 5 p.m. from London Bridge to Brighton (first class only), was also the heaviest, and always totalled up to a load of 18 to 23 coaches, so that a good engine was necessary to keep time with it. The other "first class only" trains, not being the business expresses, were usually not frequently worked by some of the smallest single engines on the line with 6 ft. and 5 ft. 6 in. wheels, such as 161 *Havant* already described, and not infrequently by the old *Penge* 133, a small engine of the "Jenny Lind" type, built at Brighton in 1859, and having 5 ft. 6 in. wheels and 15 in. by 22 in. cylinders.

The Brighton railway certainly did not aim at very high speeds, and I believe it was at one time (until about 1885) under-



[No. 305, "GENOA."
Mr. Stroudley's 0-4-2 Mixed Traffic Engine. Series 300 to 313 (Class D2). Built at Brighton Works, 1876–1883. Wheels, 5 ft. 6 in. Cylinders, 17 in. by 24 in.

quite so fast, and averaged 70 or 75 min. runs.

The Pullman cars were first used in 1876, after the Midland had introduced them two years before. In that year the Brighton Pullman express consisted of one car, five first and second class composite carriages and two vans, and was first worked by the Craven 6 ft. 6 in. single No. 128 *Croydon* (afterwards No. 375), which has already been described. But the Pullman trains for a good many years were not particularly exhilarating in the matter of speed, and were timed at only about 40 m.p.h. This may account for the fact that during 1876–8 they were stood that 60 m.p.h. was not to be exceeded except under very special circumstances. In 1884 the Pullman trains from Victoria and the Eastbourne expresses were worked by the "Stephenson" class single engines. In spite of the limiting speed mentioned above these engines were occasionally known to reach 70 m.p.h. when running the 70-minute trains from Victoria to Brighton.

In 1883 Foxwell recorded only fifteen express trains of which the journey speed was over 40 m.p.h., all Brighton and Eastbourne trains to and from London, the fastest being the 46·6 m.p.h. of the 5 p.m. down from London Bridge.

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The same writer also mentions that of the Eastbourne expresses, the 9.55 a.m. up, on account of weight of train, sharp curves at Polegate, Lewes and Keymer Junction, and the junctions and suburbs passed in such a short journey, might have been considered the smartest express in the south of England. The best run between Eastbourne and London, 65½ miles, was performed in 87 min. at a running average of 45 m.p.h. There were in addition sixteen "fast" trains, also on the Brighton and Eastbourne sections, which averaged a journey speed of 37 m.p.h., and a running average, exclusive of stops, of 38¾ m.p.h. There was then no real express on the Portsmouth line, possibly because the trains carried third-class passengers. But a year or two later there appeared a Portsmouth express, the 4.55 p.m. from London Bridge, which ran through without a stop at a speed of 43 m.p.h., taking exactly two hours for the journey. And in 1889 this train had two stops added to its schedule, but nevertheless arrived at its destination at the same time as before. The 9.55 a.m. up from Eastbourne was then much the best third-class train that the Brighton Company ran, and in 1888 ran from Eastbourne to Croydon, 55 miles, in 73 min., a running average of 45 m.p.h. On March 1, 1889, Foxwell also records that a new express was put on, the 9.25 a.m. from Brighton, which reached London Bridge without a stop at 10.38. He added that "this is a speed of 41½ m.p.h., yet the company consider it so good that the train is 'first-class only.'"

This brings me to remark upon one of the predominating features of "Brighton" practice. The management naturally considered their railway to be a first-class line, and they backed up their opinion by making the best trains first class only at super-first class fares. A certain number were first and second class only, but the poor third-class passenger had generally to put up with a very inferior article. And I can understand with what pious horror the Brighton management must have regarded as a heretic a well-known bishop of that period, who remarked that he always travelled third-class because there wasn't a fourth!

An old friend of mine, who I have reason to believe is still a reader of THE RAILWAY MAGAZINE, wrote a letter many years ago to one of the technical journals to the following effect:—

London and North-Western Railway—
Tebay dep. 9.48 .. .. .. } speed
(53 miles) Preston arr. 10.55 .. } 47.4
London, Brighton and South Coast Railway—
London dep. 5.0 .. .. .. } speed
(50½ miles) Brighton arr. 6.5. .. } 46.6

The first is a fish and meat train from Carlisle to London, and the second is the fastest and most wonderful of the Brighton expresses, first-class only at rather dear fares. Moral: It is better to be a dead mackerel on the North-Western than a first-class passenger on the London, Brighton and South Coast"!

In selecting this particular Brighton express, I think my friend was not quite fair, though if his moral had been pointed at many of the other Brighton trains, such as the 9.25 a.m. up from Brighton, it would have been perfectly justifiable. For the two "business" expresses, the 8.45 a.m. up from Brighton and the corresponding 5 p.m. down from London Bridge, were such heavy trains, although first class only, that I do not think it would have been either reasonable or possible to have increased their loads beyond the eighteen to twenty-three coaches of which they were usually composed. Moreover these two trains have always been run for the benefit of season-ticket holders, who paid £30 per annum. or at the rate of about 2s. per day, so that from this point of view I think it may be fairly conceded that they got full value for their money. But when so much has been admitted, the same can hardly be said of the remainder of the "first-class" work. The following is the list of the London and Brighton expresses in 1889, taking both up and down trains together:—

No. of trains.	Time allowed. mins.	Average speed.	Class of carriage.
One	65	46.6	1st only
One	70	43.4	,, ,,
One	73	41.5	,, ,,
One	75	40.3	,, ,,
Two	80	37.8	,, ,,
One	70	43.4	1st & 2nd only
One	75	40.3	,, ,,
One	80	37.8	,, ,,
Four ..	85 to 88	35.6	,, ,,
One	80	37.8	1t, 2nd & 3rd
One	85	35.6	,, ,,

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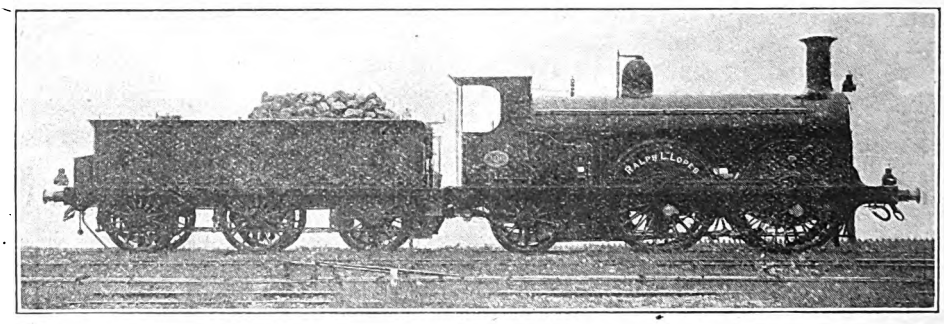
Whatever the Brighton authorities may have thought of it, there can hardly be said to have been much excuse for that list of so-called express trains. The other third-class expresses (save the mark !) took more than 90 min., and on two days a week the third-class passengers were treated to a special performance, which London Bridge facetiously called an express, which occupied 110 min. Moreover not only were the best expresses first class only, but the first-class fares were super-first-class, and the passengers by them were charged 12s. 6d. from London to Brighton instead of 10s. It is, however, fair to say that in the late eighties these extra fares were abolished, and the company contented itself with the more modest plunder derived from the ten-



No. 196, "RALPH L. LOPES."

Mr. Stroudley's "Gladstone" Class. Built at Brighton Works, 1882–1891.
Wheels, 6 ft. 6 in. Cylinders, 18½ by 26 in.

shilling fare. With the heroic efforts of the Brighton line in the direction of punctuality I will deal later, merely remarking here that the best business expresses generally kept very good time.

At the end of 1882 the first engine of Mr. Stroudley's celebrated "Gladstone" class put in an appearance. These engines are so well known that a description of them may seem superfluous, nevertheless some account of them is necessary in any mention of the locomotive work of the Brighton Railway. They are chiefly noted for the coupled wheels of large diameter, 6 ft. 6 in., placed at the leading end of the engine, and in this respect they followed Mr. Stroudley's practice initiated for *express* engines in the "Richmond" class of 1878. Mr. Stroudley's reasons for such a radical departure from accepted locomotive practice may best be given in his own words to the Institution of Civil Engineers (1885) as follows:—"By placing the coupled wheels forward, where the greatest weight is, the hinder part of the engine may have small wheels, the base be shortened, and the use of heavy cast-iron weights at the back of the engine be dispensed with. It is found that an engine runs much more smoothly when the centre of gravity is kept well forward. The large leading wheels pass over the points, crossings, &c., very easily; causing less disturbance than small ones. They pass round curves without shock or oscillation, which is no doubt owing to the small weight upon the trailing wheels, as it is the trailing wheels that have the most influence in forcing the leading flanges up to the outside of a curve. He adopted a somewhat high centre of gravity, believing that it makes the engine travel easier upon the road, and more safely at high speeds; the slight rolling motion, caused by the irregularities of the road, having a much less disturbing influence than the violent lateral oscillation peculiar to engines with a low centre of gravity. The high centre of gravity also throws the greatest weight upon the outside or guiding wheels, when passing round curves; and this relieves the inner wheels, and enables them to slip easily, to account for the difference in the length of rail to be passed over." In the sentence in which Mr. Stroudley referred to the trailing wheels having the most influence in forcing the leading flanges up to the outside of the curve, he

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enunciated a truth that has not always been recognised. For if the speed of an engine is such as not to exceed the maximum speed for which the super-elevation of the outer rail has been properly estimated, the trailing wheels of an engine will tend to move not towards the outer, but towards the inner rail of the curve, and if the wheel base be long enough, the flange of the inside trailing wheel will run against the inner rail. There were two other features in Mr. Stroudley's designs that may also be mentioned. The inside cranks and the outside coupling-rod cranks were on the same side of the axle, whereas the usual practice for inside cylinder engines was to place them on opposite sides. By this practice Mr. Stroudley found that the axle-boxes wear better as they have less thrust on them, although the arrangement requires larger balance weights. Another feature (in common with many of Beyer Peacock's locomotives) was that the diameter of the chimney at the top was less than at the bottom, the usual practice being to make the chimney taper the other way, with the widest portion at the top. The idea in this design was to allow for the condensation of the steam, which diminished the volume of the exhaust at the top of the chimney.

It may, perhaps, be of interest to add that the French Chemin de Fer du Nord was apparently so impressed with Mr. Stroudley's arguments in favour of leading coupled wheels that in 1886 it designed and constructed an express engine, No. 2,301, for the Paris-Calais traffic, on similar principles, with 6 ft. 6 in. coupled leading wheels, but whatever the advantages may have been on the Brighton, they do not seem to have materialised in France, for the engine was not voted a success, and in the following year was converted into a 4-2-2 single engine by replacing the leading wheel by a four-wheeled bogie. It ran thus for a number of years and was then broken up.

The "Gladstone" class had 6 ft. 6 in. coupled wheels, 18½ in. by 26 in. cylinders cast in one piece with the valves underneath, and 140 lb. pressure, subsequently increased to 150 lb. The boiler had a tube heating surface of 1,372·9 sq. ft., and the firebox 112·5 sq. ft., making a total of 1,485·4 sq. ft. The boiler was therefore a large one for the period. The weight in working order was 38 tons 14 cwt., of which 28 tons 6 cwt. rested on the coupled wheels.

The earlier engines of the class were stationed at Brighton and immediately took charge of the fastest and heaviest trains. No. 189 *Edward Blount*, went to the Paris Exhibition, and was afterwards tested on the Paris-Lyons and Mediterranean main line between Paris and Laroche, where Mr. Stroudley caught a chill that unfortunately proved fatal, for he died at Paris in December, 1889.

The following is the list of the thirty-six engines of the class in the order in which they were built, with their stations:—

214	*Gladstone*	1882	BN.
215	*Salisbury*	1883	,,
216	*Granville*	,,	,,
217	*Northcote*	,,	,,
218	*Beaconsfield*	1885	,,
219	*Cleveland*	,,	,,
220	*Hampden*	1887	,,
200	*Beresford*	,,	,,
199	*Samuel Laing*	,,	,,
198	*Sheffield*	,,	,,
197	*Jonas Levy*	1888	,,
196	*Ralph L. Lopes*	,,	,,
195	*Cardew*	,,	NX.
194	*Bickersteth*	,,	,,
193	*Fremantle*	,,	B.
192	*Jacomb Hood*	,,	,,
191	*Gordon-Lennox*	,,	NX.
190	*Arthur Otway*	,,	,,
189	*Edward Blount*	1889	BN.
188	*Allen Sarle*	,,	B.
187	*Philip Rose*	,,	,,
186	*De La Warr*	,,	,,
185	*George A. Wallis*	,,	E.
184	*Carew D. Gilbert*	,,	,,
183	*Eastbourne*	,,	,,
182	*Hastings*	,,	BN.
181	*Croydon*	1890	,,
180	*Arundel*	,,	B.
179	*Sandown*	,,	,,
178	*Leatherhead*	,,	,,
177	*Southsea*	,,	,,
176	*Pevensey*	,,	,,
175	*Hayling*	,,	BN.
174	*Fratton*	,,	B.
173	*Cottesloe*	1891	NX.
172	*Littlehampton*	,,	BN.

BN. = Brighton, B. = Battersea, NX. = New Cross, E. = Eastbourne.

In connection with the sheds at which "Brighton" Railway engines were stationed, it was the excellent practice instituted by Mr. Stroudley to paint the shed letters on the engines, and in a conspicuous position inside the cabs there was the name of the driver neatly painted

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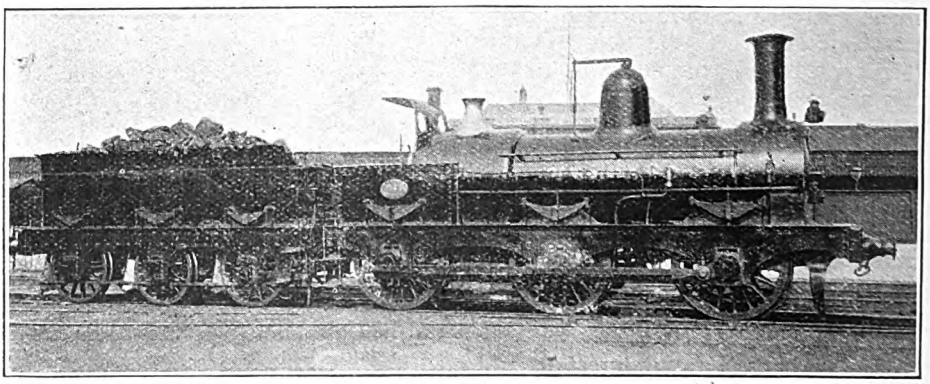
in. Each driver, therefore, had his own engine allotted to him, and as he always looked after it most carefully, the practice paid indirect dividends. "One driver, one engine" was the usual practice on most railways until the ten-hours' day and other causes resulted in the practice of double manning the engines by reliefs. More mileage is got out of the engines by the latter system, but they are now-a-days not looked after nearly so well as used to be the case, and occasionally Driver Smith has a way of putting the tools somewhere where Driver Jones, who follows him, cannot find them easily. In Mr. Stroudley's time the Brighton engines were kept in a most beautifully clean condition, both as regards the motion and the exterior painting, in which they

railways. The line is far from being what may be termed a "heavy" one as far as the gradients are concerned, but the expresses from London Bridge have to climb 2½ miles of 1 in 100 from New Cross to Forest Hill, and there are several long banks of 1 in 264 in both directions right through to Brighton. The "start" of the up trains from the latter station has to be made on a 4-mile rise of 1 in 264 which begins at a short distance of half a mile from Brighton station. There is also the adverse element of a crowded suburban area between London and Croydon, and also of the presence of the South Eastern trains on the main line as far as Red Hill, to the influence of which I shall again refer. One of the "Gladstones" in 1885 ran from London



Photo] [*Locomotive Publishing Co., Ltd.*

GOODS ENGINE No. 394.

Built by Mr. J. Craven, 1865. Wheels 5 ft. Cylinders, 16 in. by 24 in. (Some 17 in. by 24 in.)

were only equalled by Mr. S. W. Johnson's Midland engines.

The "Gladstones" worked principally between London, Brighton and Eastbourne. Those stabled at Battersea and New Cross were to be seen occasionally on trains to and from Portsmouth, though this was not their regular route. The three Eastbourne engines had charge of the 8.30 a.m. up and the 5.5. p.m. down from London Bridge. The New Cross engine, 195 *Cardew*, usually ran the 9 p.m. boat train from London Bridge to Newhaven.

The runs made by the Brighton engines showed no opportunities for sustained speeds such as are met with on the northern Bridge to Brighton with 174 tons, 50½ miles, in 63 min., giving an average speed of 48·9 m.p.h., the average beyond Croydon being nearly 52 m.p.h., and the minimum at the top of the New Cross-Forest Hill 1 in 100 bank being 35 m.p.h. Another engine of the same class ran a train of 200 tons from Brighton start to Croydon stop at an average speed of 48·3 m.p.h.

The punctuality of the crack business expresses was always good, but the same could not be said of the average punctuality throughout the system. The fault it may be stated at once, could not be put down to the engines, which invariably did all that they were required to do,

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and could have done very much more had they been called upon. And this brings me to the Traffic Department of this railway, which was such as ought really to have a special chapter to itself.

According to the average Locomotive Department, the Traffic Department of a railway consists of a body of well-meaning individuals, a great many of whom lack a due sense of proportion, and who are possessed of a constitutional aversion to the effects of the force of gravity. Thus they will frequently persist in timing a 300-ton train uphill at a greater speed than they allow for a 100-ton train, or than they chronicle in their carefully prepared time-tables for the same train running an equal distance downhill. And as for their methods of timing a fast stopping train between stations a few miles apart, only the drivers and locomotive inspectors could do justice to the sad mess that they sometimes make of it. It is true that they sometimes condescend to meet the locomotive inspectors in solemn conclave, from which function they go back home and continue in the same old way. The above remarks may be taken generally to apply to a good many railways, and not specially to the Brighton line only. According to the Traffic Department, the Locomotive Department is a necessary evil with some occasional redeeming features the chief of which apparently is that it forms a convenient peg on which to hang mythical causes of unpunctuality, which of course, except in very rare and exceptional instances, cannot possibly be ascribed to the traffic side. Has anybody ever met the traffic man, who in cases of emergency, did not book an odd minute or so against the engine ? If so, let him produce the phenomenon, who would probably form a most interesting exhibit in a railway museum.

Anybody who desired to see the funny side of the Brighton line of last century would not have found it in the business-like methods of the Locomotive Department at Brighton works. It is but rarely that a Traffic Department has a funny side, but the Brighton one at London Bridge was a perfect "scream." It was the quaintest collection of genial railway Friar Tucks that ever extorted first-class fares in return for third-rate facilities, except, of course, those of the South-Eastern. Readers will please understand that the fearsome lot to which I refer belonged to the nineteenth century, and that naturally my remarks have no present application whatever

And this is how they managed things down to A.D. 1895.

Near Fratton there existed a junction with the London and South-Western Railway,* at which passengers from Southampton and stations west had to change into the Brighton Company's trains for Worthing, Brighton and stations on the coast line. It would, perhaps, naturally be concluded that there would have been some arrangement as to suitable connecting trains. One train from Southampton was due to reach Fratton two minutes before the departure of the Brighton train, but the latter never waited for it in case it was two or three minutes late. Fratton was the one station on the line where the Brighton Traffic Department appeared to make every endeavour to get the trains away to time. On the other hand the South-Western train for Southampton left Fratton six minutes before the Brighton train was due. I believe the London and South-Western authorities did their level best to get London Bridge to agree to suitable times for connecting trains, but were met with a stolid *non possumus*. The "Brighton" traffic people conducted their extensive *non possumus* proceedings with other companies, and with the general public with great politeness and courtesy—everybody admitted that—and it is but a duty to record that whatever their administrative sins, which were many, they were most affable sinners to deal with so long as the long-suffering public did not expect to get any tangible results out of them. Which nobody ever did !

In *The Times* of September, 1895, there was a long correspondence under the heading of "The Crawl to the South," in which the Brighton and the South-Eastern lines occupied the leading *roles*. A few samples of things as they then were may be of interest.

One night the down evening mail train set out gaily, and when it had reached somewhere in the wilds on the Surrey

* Fratton is on the joint line, the actual junction with the L. & S. W. R. being at Cosham.

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border of Sussex, some one discovered that a mail-bag was missing. It was not alleged that the missing bag was the fault of the Brighton people, but knowing their own little failings, their uneasy consciences made them stop the mail train for an hour whilst somebody was sent to look for it on the Tunbridge Wells line. There were nearly 400 passengers in the train, who were presumably desirous of getting home that night. But this was not all. The missing mail-bag caused such a commotion on the Tunbridge Wells line that the train from East Grinstead via Lewes did not reach Brighton till many ages after it was due. This train made a connection at Brighton with the 10.50 p.m. for London, and so the officials kept the latter train with all its passengers waiting at Brighton until 12.20 a.m., when they reluctantly despatched it,, the Tunbridge Wells connection having not yet arrived. What happened to this last-mentioned train was never stated, but presumably a relief expedition was fitted out, and rescued it later in the year.

One Hastings express was described as follows by an unfortunate passenger. "It was a light train running on a lovely afternoon, and there was no snow or rain, no head wind or fog. We swept on so rapidly that the speed could not alarm the most timid. We did not scamp a single stoppage, and yet we steamed into Victoria at 5.30 so proudly that I felt sure we must have arrived unexpectedly early. The time-table (a work of fiction!) indeed made us arrive at 4.37, but this I saw must be merely a printer's error. Is there another line in the world that would dare to run such a train at the break-neck speed of 74 miles in 200 mins."

Another sufferer who called himself a Traveller by the "Long time Blighted and Slow Coach Railway" seems to have had a justifiable and long-standing grievance anent the last train which was supposed to leave Sutton at 10.31 p.m. for London Bridge, where it was due at 11.15 p.m. The trouble with this train was that it had a rooted objection to making a start on the same day on which the time-tables gave out that it should depart. On one occasion it left at 12.5 a.m., *i.e.*, 93 min. late, but a few days afterwards it made honourable amends by getting away only 61 min. behind time. Without intermission it varied from a minimum of 15 min. to the maximum of 93 min. late, until so many nasty remarks were made that an account of its doings eventually reached London Bridge. The Traffic Department woke up and made a special effort, and actually got it away one night to time. (This is a fact!) Never had the Sutton line been so hustled.

The above occurrences were contemporaneous with the 1895 race to Scotland of the East and West Coast lines to the north, and on September 14, 1895, an editorial appeared in *The Times*, parts of which are, perhaps, worth quoting. "The Southern managers have no doubt been aware that it would be of very little use for them to attempt to rival the magnificent performances of the Great Northern and London and North-Western companies. Their rolling-stock and the well-established traditions of their companies put it out of the question that they should try this with success. They have hit accordingly upon another method of distinguishing themselves more suited to their capacities. They have chosen frankly a very different form of distinction, and the struggle between them now is which of them can claim to have established the slowest, the most unpunctual, and the most inconvenient service of trains. The real rivals are the South-Eastern and the London, Brighton and South Coast lines, and the performances of both are so singular, and their claims to the honour which they are seeking are so nearly balanced, that there are good grounds for a difference of opinion as to their respective merits. Very bad they both are, this at least the most severe critic must admit, difficult as he would find it, on a review of the evidence, to say with certainty which of the two has the better right to call itself absolutely the worst line in the country. The Brighton had run an express from Banstead to Victoria, a distance of 14 miles, in just 1 hr. 52 min., that is at the rate of exactly one mile in eight minutes. But this was explained away as a special performance for which the company could claim no praise, since their train had been delayed by a block on the line. Then it succeeded in running a train from Hastings to Victoria, 74 miles, in 200 min., and the train arrived nearly an hour

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behind time, giving proof of a good performance, but hardly good enough to stand against the fierce competition of the South-Eastern Railway."

The Chairman of the South-Eastern Railway in 1893 stated that delays on the "Joint Line" were nearly always caused by the London-Brighton and South Coast Railway, which had many more trains over this portion of the line. This statement, coming from the South-Eastern Chairman, gives the impression that *qui s'excuse s'accuse*, and that the South-Eastern was far from blameless.

I have already made mention of this joint London Bridge to Redhill section when dealing with the South-Eastern Railway, and of the friction which its working caused between the two companies. Nominally the working was extremely complicated, but in actual reality it was delightfully simple, and consisted chiefly in a method whereby, if a South-Eastern signalman controlled a signal-box, he generally allowed a slow train belonging to his company to precede and get into the way of an express belonging to the Brighton line. *Vice versa*, when a Brighton signalman in a joint box received the announcement of the impending approach of a South-Eastern train, he managed to find some Brighton procession of coaches of no particular importance, which could be utilised to occupy the metals. Unfortunately the honours of this game of "Sauce for the goose, sauce for the gander," could not be evenly divided, since the Redhill-London section was used by the Brighton main line expresses, whereas the trains of the South-Eastern were mostly less important locals and slow trains for the Reigate and Reading line, &c. The result was that the Brighton necessarily had the worst of the deal, and the passengers in some of their express trains found much scope and opportunity for the production of divers brands of explosive profanity.

Nevertheless the South-Eastern signalman who controlled the junction box at Redhill must have been a real godsend to the Brighton authorities, who looked after the punctuality or otherwise of that company's trains. Frequently it was the fault of the South-Eastern, but I am rather afraid that whenever the Brighton trains were late, and they showed no great regard for punctuality, the genial sinners of London Bridge hid themselves in a sort of bomb-proof shelter behind that signalman, and what the company would have done without him heaven only knows! The man must have worked hard to get the wrong train first, and possibly might have got into very sad trouble if through inadvertence he had made the opposite move.

The "Chatham" company also entered the competition of "The Crawl to the South," but appears to have been considerably outclassed, for bad as it was, it seems to have emerged from the struggle with the fewest casualties, and compared with the other two must have been a really first-rate railway.

Of course shoals of letters of complaint from irate passengers poured into London Bridge, and the Traffic Department handed them over to the Superintendent of Fiction, whose clerical staff worked very hard in drafting polite but stereotyped replies to the effect that the company was really extremely sorry, but they could not (by which they meant that they would not) be held responsible for damages due to delays which were not their fault. In the last sentence that South-Eastern signalman may have been inferentially implied in the abstract, though not directly expressed in the concrete. If he did not get a handsome bonus at the end of the year from the Brighton company it was a grave injustice, for the must have saved them hundreds of pounds in unpaid damages.

And in spite of all this a gentleman interested in railway matters followed it by compiling a long and elaborate pamphlet on the London, Brighton and South Coast Railway, of an exceeding dryness, full of figures and timings of trains of all sorts—from main line expresses to Upper Tooting "particulars" in which he apparently proved that the Brighton engines climbed the banks at a speed somewhat better than did those of the South-Eastern, and from this the reader could draw the inference that of the two sinners the Brighton was rather the better. Q.E.D. I cannot say that it was, for they were both pretty much of a sort.

And in 1898 Mr. Rous-Marten, in his annual bulletin to the International Railway Congress, reported:—"With

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reference to the work of the London, Brighton and South Coast Railway I have again littleof interest tc relate. The booked speed is poor, and in my experience much time was lost by signal checks or otherwise. Travelling by the train known as the "Isle of Wight special express" from London Bridge, the time lost to Portsmouth Harbour (86¾ miles) was no less than 64 min.! The engine was not blameable for the loss, which was due to defective traffic arrangements along the line. It is curious to note that the time of the London, Brighton and South Coast's fastest run, viz.:—London to Brighton (50½ miles) in 65 min., is exactly the same as it was in 1857, forty years ago!"

So it would seem that in spite of the lengthy *Times* correspondence and articles, and also of the whitewashing pamphlet previously alluded to, the same old game was in progress two years later. The Brighton Railway motto remained "*Punctuality* is the thief of time."

When not engaged in transferring part of the responsibility for this unpunctuality to their South-Eastern neighbour, the London Bridge authorities placed the remainder of it on the shoulders of the travelling public, who they said would not turn up at the stations in sufficiently early time. The facts are that the Brighton company, like their southern neighbours, scrupulously weighed every particle of luggage with the same scientific exactitude as the modern provision shops weigh tea and margarine (inclusive of the paper). The fine-art avoirdupois proclivities of London Bridge and Victoria would have done credit to the troy methods of a dispensing chemist in the poison business. Consequently there was naturally insufficient time for the process. The company seemed to expect the long-suffering public to attend the place of execution hours beforehand so that due time should be provided for their satellites to extract excess shekels for a few extra pennyweights of luggage.

But it is now just and fair to the Brighton Company to examine the other side of the ledger, and to chronicle certain excellent features of Brighton management. In the first place this was one of the first English companies to adopt an efficient continuous brake, and so pay due regard to the safety of the passengers. Nearly all the Brighton engines and rolling-stock were fitted with the Westinghouse brake whilst the London and North-Western was playing about with a mechanical toy, and some of the other northern lines were persisting in clinging to a non-automatic brake in spite of the thunderbolts of the Board of Trade. In June, 1879, there were 54 engines, and no less than 513 carriages on the Brighton line, supplied with the Westinghouse brake. The passenger communication with the guard was another feature in which the Brighton was miles ahead of the large northern railways. The latter clung to the obsolete cord communication, in which a passenger had first of all tc read a lengthy notice fixed in the compartment, and having digested that, had to lean out of the window and haul in a few yards of slack cord, and finally, as often as not, he drew a blank. The Brighton arranged an electric bell in each compartment which communicated with the guards' van. According to *Punch*, one of the super-first-class patrons of the line, on the earliest appearance of the new apparatus, rang the bell for a "whisky and soda." What he actually got *Punch* did not state; possibly it was forty shillings or a month.

The lighting of the carriages was also excellent. Electric light was provided in many trains, and was a vastly better convenience than the dingy oil lamps of the northern lines.

The stations were kept in very good condition, and were always neat, clean and tidy.

Finally, the company instituted a good service of Sunday trains, seaside expresses to the coast at very cheap rates. In respect of these facilities the Brighton might truthfully be said to have been the leading line in England.

(*To be continued.*)

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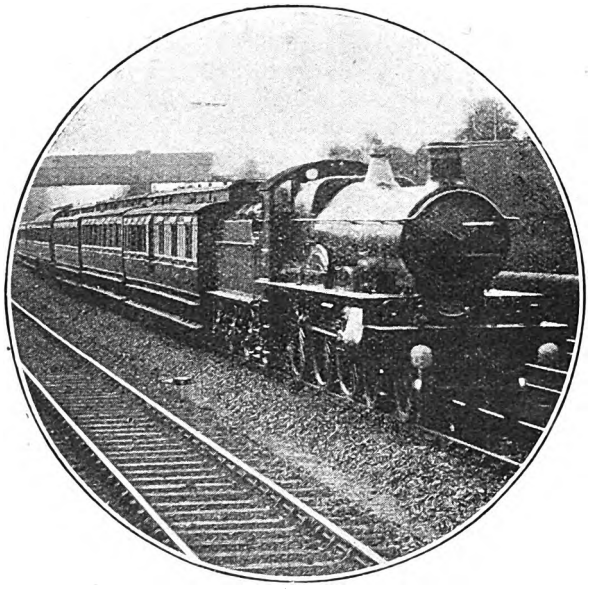
British Locomotive Practice and Performance.

By CECIL J. ALLEN.



Photo] [*F. E. Mackay.*

GREAT WESTERN RAILWAY.

4-6-0 ("Saint" class) Locomotive, No. 2974. "Lord Barrymore," on up Penzance and Bristol train passing Acton.

IN continuing the discussion which occupied our attention in the February RAILWAY MAGAZINE as to future travel possibilities in this country in the matter of speed, I have the hardest part of the task still before me. It will be remembered that in the article referred to I discussed the proposed schedules of our leading high speed advocates—in particular those of Lord Monkswell—but questioned the feasibility of their constant observance, day in and day out, in view of the fact that no allowance appeared to be made to cover *en route* delays, to compensate for the possibility of which it is necessary to allow at least some small margin. My own suggestions I left over until this issue. But in making them I realise that it is a great deal easier to work havoc with the proposals of others than it is to lay down oneself a practical basis of timing, which shall both take into account the immensely enhanced tractive possibilities of the modern locomotive, while at the same time allowing a reasonable margin over and above those possibilities, in order as far as possible to ensure punctual working. We have become so accustomed in these days to the haulage of colossal loads at moderate speeds, that there has been little or no opportunity of observing what the locomotive of to-day really can do with moderate loads, and there is no formula which, by equating load on the one hand with speed on the other, will enable us to arrive at that conclusion. A moment's consideration will suffice to show the reader that if you halve the load, for instance, you cannot forthwith double the average speed, for the same output of tractive effort.

The general proposal under discussion is that extra speed in transit shall command extra payment on the part of the traveller, and that for this purpose special expresses of limited formation shall be run on each main line at a higher speed than has hitherto been customary. It is assumed that these fliers would be made up to a total load of 200 or 250 tons: for the purpose of argument let us take the latter figure. On the basis of existing rolling stock it would be equivalent on the Great Western Railway to seven 70 ft. 8-wheelers, including restaurant car; on the London and North-Western and Great Northern Railways to seven corri-

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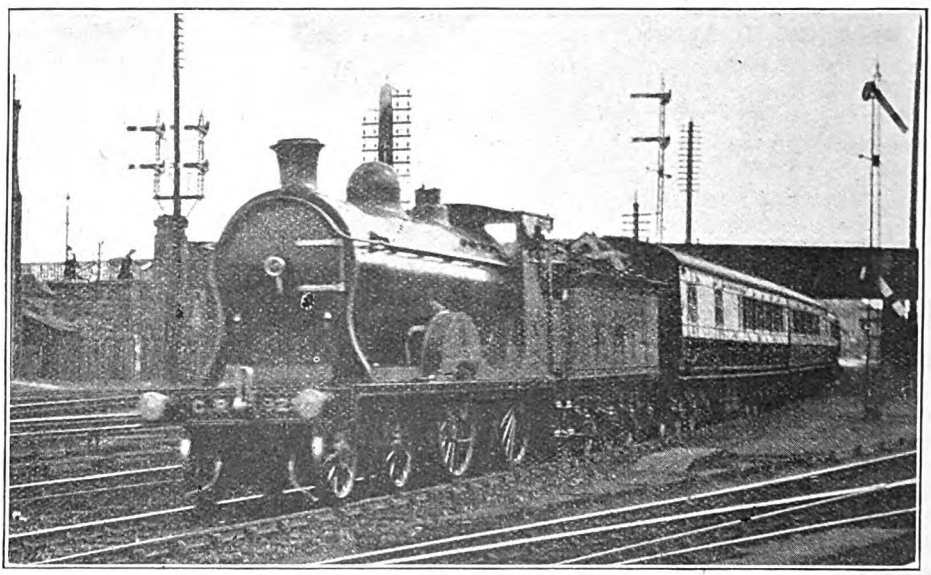
dor bogies and a 12-wheeled "diner"; on the Midland Railway to a dining car "set" of two 12-wheeled cars, *plus* six corridor "eights"; on the Great Eastern Railway to a nine-coach vestibuled train including restaurant cars; on the Great Central Railway to seven of the heavy 60-ft. cars; on the London and South-Western Railway to rather over seven corridors and a dining car; and on the London, Brighton and South Coast Railway to the full "Southern Belle" set, shorn of one vehicle, or six 12-wheeled Pullmans. The weights of these trains, together with a moderate quantity of passengers and luggage, would total up approximately to 250 tons in each case.

Now it is immediately evident that, whereas trains of this formation would offer, at any reasonable speed, a comparatively simple haulage propositon to such lines as the Great Western Railway and the London and North-Western Railway, with their magnificent grading, the case would be altogether different on, say, the Midland or Great Central Railways. On the former 240 tons used to be the maximum tare load taken unpiloted by the Class 4, or most powerful express engines of that company on the fastest pre-war schedules, while on the Great Central Railway, with its mountainous grades, a train of seven 60 ft. 8-wheelers offers substantially more accommodation than the average of its pre-war expresses. Here, then, is the first difficulty. Employing existing locomotives, we shall obviously be unable to time trains of a uniform weight at the same average speed on different lines, or indeed on different sections of the same line, as, for example, between Euston and Warrington, and Warrington and Carlisle respectively, on the London and North-Western Railway. Alternatively, it will be necessary on some lines to reduce our standard load, and in point of fact, seeing that extra fares are proposed by these trains, I do not doubt that, as a commencement at anyrate, 200-ton trains would amply meet all requirements on such lines as the Midland, Great Central and Great Eastern Railways.



Photo] CALEDONIAN RAILWAY. [*R. A. Chrystal.*

North Express leaving Stirling.

Let us first, however, examine the possibilities on the London and North-Western and Great Western main lines. On the former we will assume a 250-ton express out of Euston, hauled by one of the incomparable 4-4-0 "George the Fifth" type engines. It should be pos-

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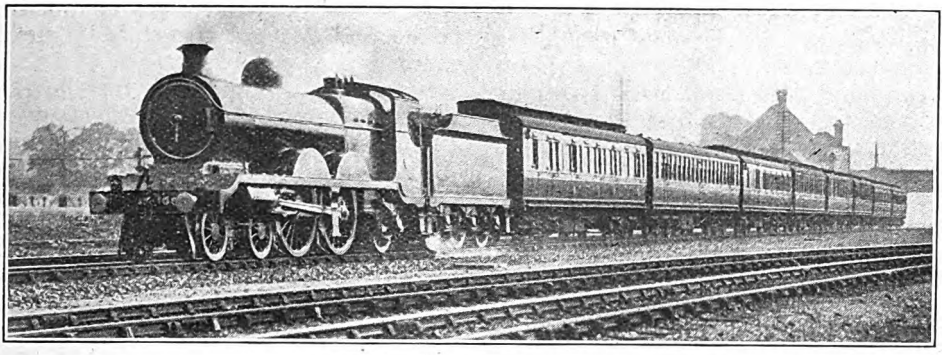
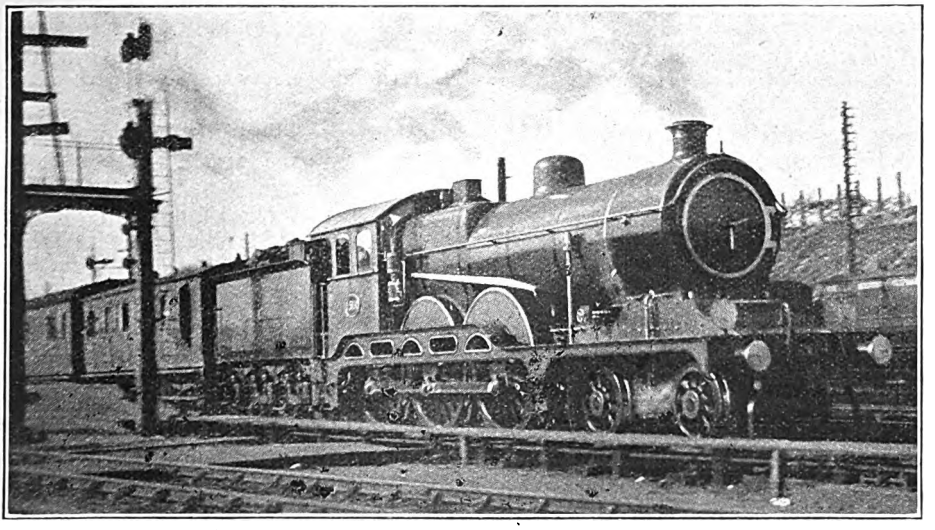


Photo] GREAT CENTRAL RAILWAY. [*F. E. Mackay.*

Pre-war 10 a.m. down Sheffield and Bradford Express. 4-4-2 Locomotive, No. 1084.

sible to get through Willesden without difficulty in 8 minutes, and then, seeing that *Wild Duck* contrived to cover the 26¼ miles thence up to Tring in 27¾ min. with 410 tons behind the tender, 25 min. should be a reasonable allowance from there to the summit point—total 33 min. for 31⅝ miles. From Tring we will allow a 75 m.p.h. average on to Wolverton, taking us through Bletchley, 46⅝ miles, 12 min. later, and a minimum of a little over 60 m.p.h. at Roade, whereby we should complete the 59¾ miles to that point in 56 min. Rugby, 82⅝ miles, would be breasted in another 20½ min. (allowing a reduction to 60 m.p.h. through Weedon), and will assume a continuance of the existing 40 m.p.h. service slack through Rugby itself. From this point, if the train were running to Birmingham, a further 28½ min. would prove a more than ample allowance for the remaining 29 miles of the journey, making a total of 105 min. for the 113 miles. If we were continuing to Crewe, however, we should require 13½ min. from Rugby to Nuneaton (total 97 miles in exactly 1½ hours from London), 10½ min. thence to Tamworth (110½ miles), 12 min. on to Rugeley (124¼ miles), and 8½ min. further to Stafford, allowing for the slack over Trent Valley Junction. From Stafford,



Photo] GREAT EASTERN RAILWAY. [*A. Gaze.*

Norwich-London Express. 4-6-0 Superheater Locomotive, No. 1500.

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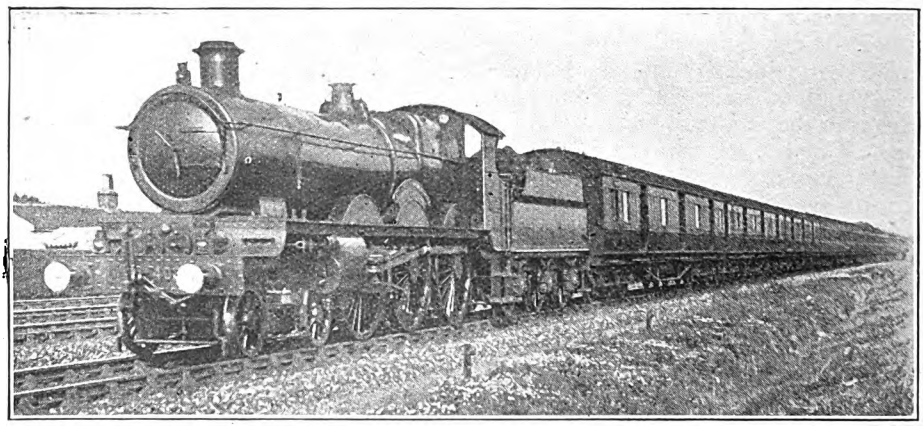
133½ miles out of town, passed in 121 min., it would be reasonable to allow a 60 m.p.h. average up the gradual ascent to Whitmore, 147½ miles, passed 14 min. later, and a 10 min. run from the summit, with a cautious negotiation of the junctions at Crewe south end, would bring us into the London and North-Western Metropolis in 145 min. from Euston—158 miles.

If this were a Manchester and Liverpool "Limited," we could imagine the Liverpool portion of three "eights" and a dining-car passing Crewe in 144½ min. from London, and slipping there the further three coaches constituting the Manchester portion. With the lightened load the London engine should have no difficulty in reaching Liverpool (Lime Street) in 3 hours, *i.e.*, covering the 35½ miles in exactly "even time," while the Manchester portion, stopping in Crewe 4 min. and attaching a fresh engine, would with ease complete its journey to London Road in the same overall time. This would mean running the 30⅜ miles from Crewe to London Road, *via* Styal, in 31 min., start-to-stop, inclusive of slacks at Wilmslow and Longsight Junctions. These overall times would constitute respective improvements of 40 and 30 min. over the fastest pre-war non-stopping schedules from London to the cities concerned, and it is, of course, reasonable to assume that with such "fliers" in being, the ordinary expresses at ordinary fares would stop at various intermediate points, and thus not give so fast a service as was given by the latter.

Were our "Limited" travelling to Scotland, however, we must assume a 4-min. stop at Crewe to change engines and examine the train, and should then resume our journey 149 min. after leaving Euston, in charge of a 4-cylinder 4-6-0 of the "Claughton" type. Having due regard to the necessary moderation of speed at Weaver Junction, Warrington, Wigan and Euxton Junction, I do not think we could expect to get through Warrington and Wigan, 24⅛ and 35⅞ miles, in less than 22½ and 33½ min., respectively, from Crewe, and it would need good going up Boar's Head bank to breast Preston, 51 miles, in 50 min. from the start. Reducing speed here to the customary 15 m.p.h., we should need 20 min. on to Lancaster, 72 miles, 5 min. thence to Carnforth, 78¼ miles, and 12 min. on up to Oxenholme, 91½ miles. A "Claughton" should be able to compass the 7 miles' ascent thence to Grayrigg in 8 min., to run the 6 miles from Grayrigg to Tebay in 5½ min., and from Tebay up to Shap Summit, 5⅝ miles, in 6½ min.; this would leave us 28 min. for the 31¼ miles down to Carlisle, without excessive speed anywhere, and with due allowance for curves where speed must be reduced. That is to say, the 141 miles from Crewe to Carlisle would have occupied 136 min., the total from London, inclusive of the



Photo] GREAT WESTERN RAILWAY. [*H. T. Worlock.*

4-6-0 Locomotive, No. 4026, "King Richard," with train of empty coaches near Hayes.

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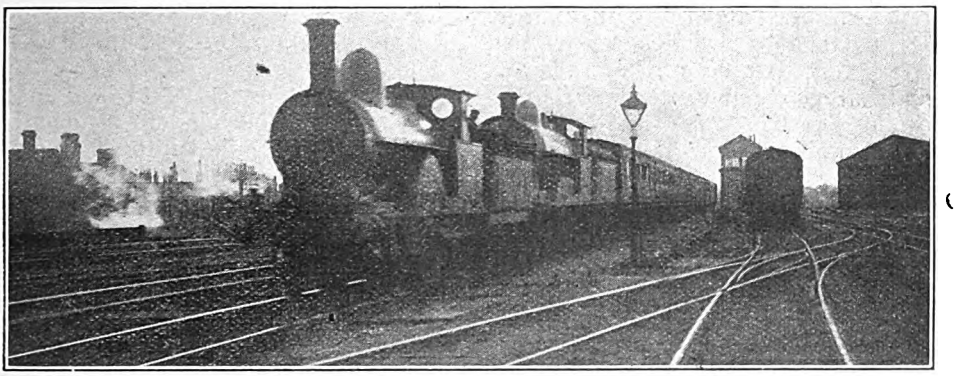
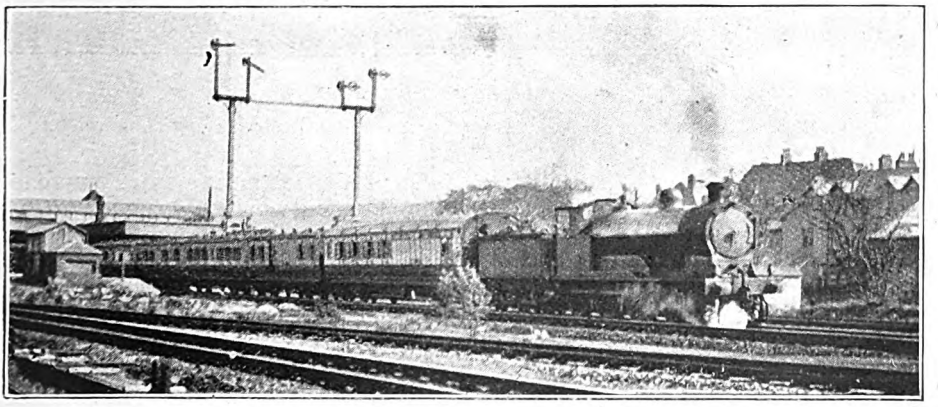


Photo] LONDON & NORTH WESTERN RAILWAY. [*Chas. S. Lake.*

Down Manchester Express approaching Bletchley. 2-4-0 leading and 4-6-0 train engine.

stop at Crewe, being 4¾ hours, less one minute. From Carlisle, after another 4-min. halt, the Caledonian Company would have the task of completing the 102½ miles to Glasgow in 102 min. It should be possible with this load to get through Beattock in 39 min., and past Summit in 54 min.; allowing 19 min. for the 23¾ miles from Summit to Carstairs, there would then be 29 min. left in which to negotiate at moderate speed the 29-mile section thence, nearly all downhill, but hampered with slacks over colliery workings, into Glasgow. Aggregate times from Euston to Glasgow (Central) would thus be 6½ hours—just over a mile-a-minute average—and this timing, 1½ hours in advance of the best previously operating, would enable a business man to have a full day's business in London, leave Euston at 4 p.m., take tea and dinner *en route*, and be in Glasgow at 10.30 p.m. Furthermore, the schedule outlined would not tax the locomotives to the utmost limit of their capacity, and would allow a slight margin against contingencies.

It is comparatively simple to outline a schedule for the Great Western Railway West of England main line, *via* Bristol. The Great Western 4-6-0's, both 4-cylinder and 2-cylinder, have shown themselves capable of a speed of 75 m.p.h. on the level with trains of over 300 tons gross weight, and if, therefore, we assume an average of 72 m.p.h. with 250 tons, we shall be well on the right side. Allowing 10 min. to cover the initial 9 miles from Paddington to Southall, we should be through Slough, 18½ miles, in 18 min.; Reading, 36 miles, in 32½ min.; and Didcot



Photo] LONDON & NORTH WESTERN RAILWAY. [*E. L. Diamond.*

Up Express leaving Colwyn Bay. 4-6-0 Superheater Engine, No. 610, "Albion," ("Prince of Wales" class).

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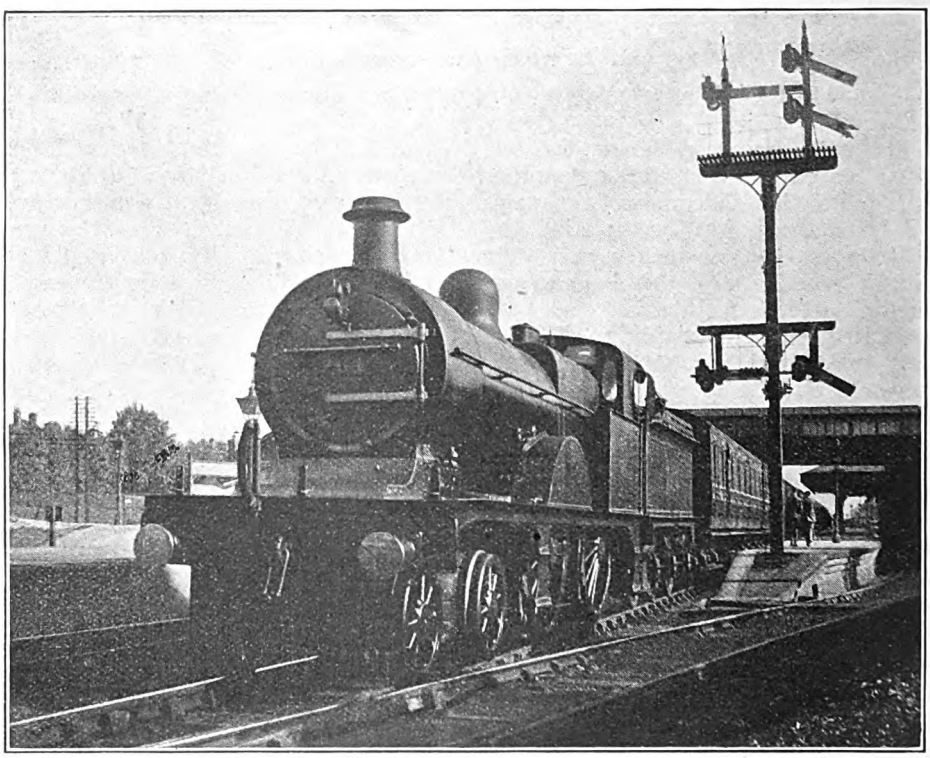
53 miles, in 46½ min. For the faintly rising grade on to Swindon a reduction in average speed to 66 m.p.h. is allowed, so that we should pass the latter town, 77¼ miles, in 68½ min., and Wootton Bassett, 83 miles, in 73½ min. From the last-mentioned junction to Bath, including the descent of Dauntsey bank and again through the Box Tunnel, we can safely hazard an average of 75 m.p.h., which with a slight allowance for the slowing through Bath, would carry us through Bassett and the severe one at Filton Junction. As regards South Wales, it should be possible, if Stoke Gifford Junction (111¾ miles from Paddington) were passed in 98 min., to complete the remaining 21¾ miles into Newport in 22 min., even allowing a comparatively moderate speed through the Severn Tunnel and Severn Tunnel Junction. This would make a total of 2 hours to Newport, a little over 2¼ hours to Cardiff, and between 3 and 3¼ hours to Swansea.



Photo] MIDLAND RAILWAY. [*F. H. Stingemore.*

4-4-0 Belpaire Express Engine, No. 764, on down semi-fast train leaving Harpenden.

the Spa in 93 min. In the concluding 11½ miles, although they are still level, time must be allowed for recovery from Bath slack, and the approach to Bristol, but even so no difficulty should be experienced in covering them in 12 min., which would land us in Temple Meads Station 1¾ hours after leaving Paddington. To complete the journey *via* Badminton in the same time would involve some hard running over the South Wales direct line, in view of the slack at Wootton

On the Westbury route our express from London would pass Reading in 32½ min., as before. Thence the two successive 17-mile stretches of gradual upgrade would probably occupy 17 min. each, after which the 25½ miles' racing stretch to Westbury would be covered, at an average of 75 m.p.h., in 20½ min.—total 87 min. from Paddington. Slacking through Westbury and Frome, we should occupy 7 min. between these points (5¾ miles), and 8 min. for the subsequent

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7¼ miles to mile-post 122¾; the ensuing 34½ favourable miles to Taunton, if covered at an average of 74 m.p.h., would take us through that town in 130 min. from London. A further 28 min. would take us through Exeter, and another 20 min. through Newton Abbot, where a coach or two would be slipped for Torquay, and leaving, 4 min. later, would be in the seaside town in 3¼ hours from Paddington. Meanwhile the express proper would be hurrying over the "mountains" of Devonshire on to Plymouth; it is difficult exactly to estimate what time should be occupied over this section, but on the same basis of effort, 3 hours 35 min. should bring the train into North Road, *i.e.*, 32 min. under the time of the pre-war "Riviera, Limited." Finally, on the Birmingham route, in order to equal the London and North-Western time of 1¾ hours from London, it would be necessary to pass Greenford, 7¾ miles, in 10 min.; High Wycombe, 26½ miles, in 27 min.; Princes Risborough, 34¾ miles, in 36½ min (the extra time between the two last-mentioned stations allows of recovery from Wycombe slack and the ascent of Saunderton bank); Ashendon Junction, 44¼ miles in 44 min.; Bicester, 53½ miles in 52½ min.; Aynho Junction, 62½ miles, in 60½ min.; Banbury, 67½ miles, in 65 min.; Leamington, 87¼ miles, in 82 min. (with full use of the falling grades from Fenny Compton); Lapworth, 97¾ miles, in 93 min.; while a rapid concluding run of 12 min. for the 12¾ miles into Snow Hill would account for the remainder of the 105-min. allowance.

But we must now leave the realm of pleasant fancy for that of sober fact, and I am afraid that the runs I have timed over the Great Western Railway during the later years of the war period have fallen considerably below this standard. Deferring until the next issue my remarks concerning prospective schedules over other main lines, I will now deal briefly with the runs in question, not so much as a matter of interest, but rather to put on record something at least of the work of that company under present conditions I will confine myself to two runs on the 1.0 p.m. from Paddington to Bristol, and two return journeys by the 5.5 p m. from Temple Meads to London, in each case calling at Reading.

Photo] [*K. A. C. R. Nunn.*

STRATFORD-ON-AVON & MIDLAND JUNCTION RAILWAY.

Stratford-on-Avon train leaving Woodford Junction. 2-4-0 Engine, No. 13.

On the first down journey I was unfortunate enough to select a day on which the train was divided, the portion by which I was travelling—a moderate train of ten mixed 8-wheelers, 299 tons empty and 320 tons full—leaving first and running to Bristol only, while the second, or main portion, was being worked *via* Westbury. Our engine was a 4-cylinder 4-6-0, No. 4034, *Queen Adelaide*. We

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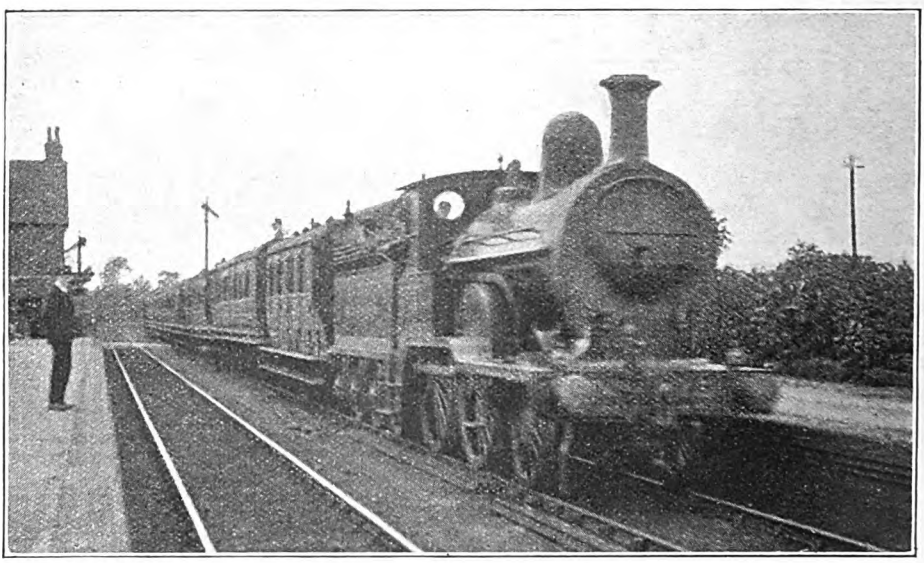
passed Southall, 9.1 miles, in 12 min. 50 sec., and Langley, 16.2 miles, in 21 min., but were then badly checked by signal, so taking 23 min. to Slough, 18.5 miles, and 42 min. 25 sec. to Reading, stop, 36 miles. Net time was about 40¾ min. After Reading we ran quite briskly for awhile, touching 66 m.p.h. at Cholsey, and maintaining 60-62½ all the way up the gradually rising grades from Didcot to Shrivenham. So we passed Didcot, 17 miles, in 19 min. 40 sec.; and Shrivenham, 35·6 miles, in 37¾ min, after which the speed was eased considerably However, we passed Swindon,

On the next journey the train out of London was a much more substantial one of fourteen corridor 8-wheelers, almost entirely 70-ft. stock, weighing 435 tons empty and 475 tons full, and the engine a 2-cylinder 4-6-0, No. 2976, *Winterstoke*. But the running was somewhat dismal, as we never managed to get above 60 m.p.h.—at Slough—and accelerated very slowly to this figure, passing Ealing at 45, Southall (in 15 min. 25 sec.) at 50, and West Drayton at 56½ m.p.h. So we passed Slough in 25 min. 55 sec., and, falling to 54 m.p.h. at Sonning, reached Reading in 45 min. 50 sec. Here we shed



Photo] NORTH STAFFORDSHIRE RAILWAY. [*K. A. C. R. Nunn.*

Crewe–Burton Express passing Radway Green. 2-4-0 Engine, No. 15.

41.3 miles, in 43½ min.; Wootton Bassett, 46.9 miles, in 49 min. 10 sec,; and Chippenham, 58 miles, in 59 min. 20 sec,. the maximum on Dauntsey bank being 72½ m.p.h. After that we encountered adverse signals all the way to Bristol, and finally stopped at Temple Meads, after spending over 20 min. on the last mile alone, in 2 hours 38¾ min. from Paddington, 23¾ min. late. Had it not been for delays from Corsham onwards, we should certainly have kept time without difficulty, despite a late start of 2¼ min. from Reading; the net time for this 82.3 miles I should estimate at 86¾ min.

a couple of vehicles, and went on with 389 tons, or 425 tons gross load. Once again we very slowly got into speed, the rate at Didcot, which was passed in 22 min. 5 sec., being 56½ m.p.h.; Shrivenham was passed in 46 min. 20 sec., Swindon in 52 min. 25 sec., and Wootton Bassett in 58 min. Things were slightly improving here, as we had got up to 58½ m.p.h. at Swindon, 64½ at Wootton Bassett, and touched 75 in descending Dauntsey Bank. So we were through Chippenham in 68 min. 10 sec.; fell to 53 m.p.h. at Corsham and rose to 72½ in the Box Tunnel; breasted Bathampton, 68.6 miles, in 79 min., and Bath, 70.9 miles, at

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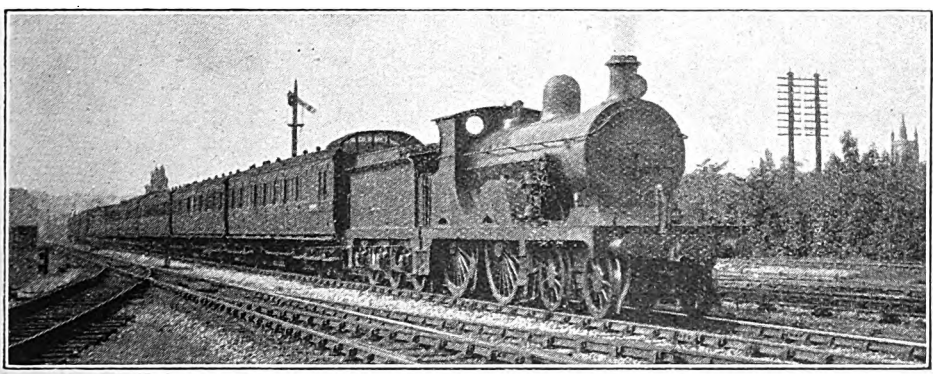
reduced speed in 81 min. 40 sec. Accelerating again to 56½ m.p.h., we passed Keynsham, 77.7 miles, in 90½ min., but once again we were afforded ample time to enjoy the gems of scenery immediately on the London side of Temple Meads station, stopping finally in just under 2 hours 43 min. from Paddington, *i.e.*, 21 min. late. I should estimate the net time from Reading to Bristol at 96 or 97 min., the engine having dropped between 2 and 3 min. on this stage, and 50 sec. between Paddington and Reading.

My up journeys were on the afternoon express from Bristol, on the first occasion leaving there at 4.45 p.m., and allowed 2¼ hours to London, while on the second the starting time was 5.5 p.m., and 10 min. further journey time was allowed. In each case the Badminton route was followed, and a stop was made at Reading. On the first run the same division of the train was made as on the outward journey, and we had, therefore, a light load of eight 8-wheelers, weighing 234 tons empty and 250 tons full. The engine was a 2-cylinder 4-6-0, No. 2954, *Tockenham Court*. We were through Filton Junction, 4.8 miles, in 10 min. 50 sec., falling to 30 m.p.h. on the 1 in 75 ascent, and then suffering a p.w. check; on the 1 in 300 up to Badminton we accelerated to 55½ m.p.h. and then fell to 49½, passing Badminton, 17.6 miles, in 26¼ min.; after this we were treated to a sustained 75 m.p.h. at Little Somerford, and so passed Wootton Bassett (at reduced speed), 34.7 miles, in 42 min, 10 sec. Then came a dead slow, through Swindon for p.w. operations, but after a long subsequent stretch at 60 m.p.h., as far as Uffington, the running became quite brisk, as we touched 72½ m.p.h. at Wantage Road, passing that point, 57.2 miles, in 67 min., and Steventon, 61.1 miles, in 70 min. 5 sec., or 67½ minutes net. Then came bad check at Foxhall Junction, followed by another to cross from main to relief lines at Reading, so that though we recovered to 60 m.p.h. between these points, our total time from Bristol to Reading was 93 min. 40 sec. for the 81.6 miles. Net time I should put at 87 min., instead of the 91 min. allowed. As we ran in, the West of England portion was at the up main platform, and the only further excitement we had was when, as a result of starting from Reading shortly after the latter, our driver attempted to overhaul the rival. This he succeeded in doing in virtue of a really brilliant start to Twyford, 5 miles in 6 min. 40 sec., at which point we had got up to 61½ m.p.h., but checks came one after another from there onwards, so that we reached Paddington 7½ min. late.



Photo] [*E. A. Gurney-Smith.*

SOUTH EASTERN & CHATHAM RAILWAY.

Down Express passing Chislehurst. 4-4-0 Locomotive, No. 745.

On the second up journey the engine was No. 2952, *Twineham Court*, of the same class as before, but the load totalled ten 70-ft. cars, 326 tons empty and 355 tons full. Speed fell to exactly 20 m.p.h. on Filton bank, our time to the junction being 12 min. 25 sec., and we then maintained 47½ m.p.h. on the ascent to Bad-

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minton (save for a fall to 45 in the tunnel), our time to the last-mentioned point being 28 min. 10 sec. Touching 69 m.p.h. at Little Somerford, we were through Wootton Bassett in 47 min. 25 sec., but signal checks followed at Swindon, far worse than the delay of the previous run; Didcot we crawled through for the same cause, and we finally drew up and enjoyed an excellent view of Reading engine sheds for a solid eleven minutes. Needless to say, these delays were not conducive to time-keeping, although the driver endeavoured, by maxima of 68 m.p.h. at Steventon and 64 at Tilehurst, to do his part in the matter. Actually we passed Wantage Road in 73 min. 5 sec., or 69¾ min. net; Didcot in 81 min. 25 sec.; and reached Reading in 116 min. 5 sec., or about 93 min. net as nearly as I could judge. The driver had now lost heart, and we never exceeded 60 m.p.h. on the subsequent journey to London, passing Slough, 17.5 miles, in 21 min. 50 sec.; Southall, 26.9 miles, in 31½ min.; and reaching Paddington, after still further delays, in 46 min. 38 sec., 21¼ min. late. This was certainly not the fault of engine or driver, however, as between them I calculate they had 6 min. to their credit on the present schedule of this train. But one might have thought it possible to work these important expresses, even in war-time, with a little less in the way of traffic delays.

Of the neighbouring London and South-Western Railway I have not written since November, 1917, when I detailed some runs on the West of England line that I had enjoyed in the preceding summer. These included a trip on the smartly-timed 3.25 p.m. from Waterloo to Exeter, behind one of the late Mr. Dugald Drummond's fine "463" class 4-4-0 engines, all of which are now superheated. The description of this run elicited from correspondents details of two further journeys on the same train, immediately before its deceleration, the type of engine being the same, but the load varying from 280 tons on the first run to 305 tons on the second. Yet in each case the engine—No. 471—appeared to be working well within its powers. From Waterloo, Clapham Junction, 3.9 miles, was passed in 6 min. 44 sec. and 7 min. 55 sec.; Hampton Court Junction, 13.4 miles, in 17 min. and 18 min. 40 sec.; and Weybridge, 19.2 miles, in 22½ min. and 24¼ min. Then followed signal checks on the first journey, making the total time to Woking 2 sec. over 37 min., but on the second No. 471 had a clear course, and arrived in 30¼ min. from Waterloo, the distance being 24.4 miles. The first journey was, of course, much the finer of the two, especially in its brilliant start, and the maximum speed of 65 m.p.h. attained on a but little easier than level track at Hampton Court Junction; net time to Woking in this case was 28½ min.

Continuing from Woking No. 471 again did brilliantly by accelerating up the 1 in 326-298 from the dead start to 54 m.p.h. at mile-post 31, passing that point, 6.4 miles, in 9 min. 58 sec., and Farnborough, 8.9 miles, in 12¼ min. But little inferior was the start on the second occasion also, the time to Farnborough being 12½ min. Winchfield, 15.5 miles, was passed in 18 min. 28 sec. and 18 min. 50 sec. and Basingstoke, 23.5 miles, in 26 min. 24 and 40 sec. On the first run a speed of 69 m.p.h. had been attained on the level at Fleet, and, after a minimum of 59 on the 1 in 337 at Winchfield, a further maximum of 67 beyond Hook, while the work on the second journey must have been very similar over this stage, as the times of the two runs closely correspond from Brookwood onwards. But on the first journey the driver was evidently keen on regaining his lost time, and therefore, dropped only to 53 m.p.h. on the 1 in 249 up to Worting—a fine effort this—passing Battledown Junction, 26.7 miles, in 29 min. 53 sec., whereas on the second journey the minimum was 44, and Worting Box (my friends timed here to different points) 26 miles, in 30 min. 20 sec.; the times to Oakley, 28.1 miles, were 31 min. 18 sec. and 32 min. 10 sec. Thence the slightly falling 6.8 miles to Whitchurch occupied 6 min. 40 and 45 sec.; the more rapid descent of 7.1 miles to Andover 5 min. 54 sec. and 6¼ min., with maxima of 77 and 80 m.p.h. on the 1 in 178; the 6.4 miles up to Grateley, 5 min. 46 sec. (minimum speed 52 m.p.h. on the final 2¾ miles at 1 in 165) and 6½ min.; the 5.5 miles from Grateley to Porton 5 min. 22 and 45 sec.; and the final

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5.5 miles into Salisbury 5 min. 18 sec. and 6¼ min. On the former occasion the top speed on Porton bank was 77 m.p.h., and the stop at Salisbury was a very quick one, whereas on the latter run the descent of the bank was more leisurely, time being well in hand. Total times for the 59.4 miles from Woking were thus 60 min. 18 sec. and 63 min. 40 sec., the first journey, with its overall average of 59.1 m.p.h., and its gain of 4¾ min. on schedule, being an exceedingly fine achievement.

Another run with some notable times was made by one of my friends on the 11 a.m. *ex*-Waterloo, about the same time, once again behind No. 471, but in this case with 325 tons behind the tender. Clapham Junction was passed in 6 min. 36 sec., at 51 m.p.h., Hampton Court Junction in 16 min. 32 sec. at 67 m.p.h., Weybridge in 22 min. 4 sec., Woking in 27 min., Farnborough, 33.3 miles, in 36 min. 37 sec., Winchfield, 39.9 miles, in 43 min. 5 sec., Basingstoke, 47.9 miles, in 51 min. 9 sec., and Battledown Box in 54 min. 57 sec.—one of the most remarkable starts for this 51.1 miles that I have ever known recorded. Minimum rate at Pirbright was 52 m.p.h., and maximum at Fleet 65, while the sustained rate up to Worting was 50 m.p.h. After that the engine was materially eased, the remaining times being: to Oakley, 52.5 miles, 56 min. 31 sec.; to Whitchurch, 59.3 miles, 63 min. 37 sec.; to Andover, 66.4 miles, 70 min.; to Grateley, 72.8 miles, 76 min. 37 sec.; and to Salisbury, 83.8 miles, 88 min. 19 sec., or 2¾ min. under schedule. If we were to combine the London—Farnborough time of this run with the Farnborough—Salisbury time of No. 471's first effort on the 3.25 p.m. down, we should have an aggregate of 84 min. 40 sec.—by the same engine throughout—for the 83.8 miles from Waterloo to Salisbury. This is a sufficient indication of the possibilities of these superheater 4-4-0's with a 200-ton "limited" in the days to come.

Another fine sample of the work of the same class of engine was a run from Basingstoke to Vauxhall, timed also by my friend who secured the last-mentioned records, on the then 9.5 p.m. up from Basingstoke, with a gross load of 360 tons. No. 464 was the engine. My correspondent remarks that the run was made in the "Blinds Down" era, and that, though the stations were visible to anyone standing in the corridor, it was impossible to see any mileposts. But why had he not read, marked, learned and put into practice the valuable method of timing from rail-joints which we considered at length in these columns a short time ago? Shorn of speed details, however, the times were these: From Basingstoke No. 464, with this substantial train, passed Hook, 5.6 miles, in 7 min. 37 sec.; Winchfield, 8 miles, in 10 min. exactly; Fleet, 11.3 miles, in 13 min. 12 sec.; Farnborough, 14.4 miles, in 16 min. 19 sec.; Brookwood, 19.8 miles, in 21 min. 10 sec.; Woking, 23.5 miles, in 24 min. 13 sec.; Weybridge, 28.7 miles, in 28 min. 25 sec.; Surbiton, 35.8 miles, in 34 min. 39 sec.; Wimbledon, 40.6 miles, in 39 min.; and Clapham Junction, 44 miles, in 42¼ min. So Vauxhall, 46.5 miles, was reached in 45 min. 54 sec., start-to-stop, the schedule of the train concerned being 52 min. Runs of such a character as these in the past are highly significant of what might be done in the future, if only the authorities could be induced to realise the commercial value of high-speed train services.

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Railway Reforms—Fiscal and Traffic Working.

By JOHN ORR.

OF post-war reforms the first to be tackled should be in connection with railways. These, on account of their importance to the industries of the country, brook no delay. Railways, like the canals and waterways, have been described as the arteries of the country and perform these very important functions in the body industrial Unless the traffic flows freely through these arteries without congestion or stoppage, the result is serious. The industrial and commercial system of the nation are, in natural course, thrown out of order. This is exactly what has happened; even in pre-war times, the arteries were not performing their function satisfactorily; the traffic was not flowing freely nor reliably. There was often serious congestion with sometimes a complete stoppage, resulting in idleness at collieries, factories, shipbuilding yards, delays to shipping, &c., causing, besides, many other irregularities and disorders.

The need for efficiency never was greater than during the war, and therefore, to enable the railways to carry on, it was found necessary to perform on them a rather severe internal operation; the appendix and many other useless and troublesome parts had to be cut away altogether. The operation so far has been successful, and many improvements have accrued.

The experience of the changes effected under the present control proves conclusively these could have been made by the railways themselves years ago, but for trifling differences between them. Nevertheless, these differences were ruthlessly swept away by the present control, with at once immediate and great advantages in traffic working. It is but right, however, to acknowledge that, with all their faults, the British railways have performed prodigious feats during these strenuous times. They have been operated by the staffs with great ingenuity and enterprise, and on the whole have risen nobly to their task. History will record their great work and do them justice. But what might they not have done had they had greater and more powerful resources at their command! Economy and efficiency, with greater revenue earning powers, are the keynotes of the reforms in view. More revenue must be earned. This is absolutely essential if the companies are to meet the enormous increase in working expenses—wages, bonus, &c., the latter now practically a fixed charge on the receipts

Fiscal Reform should begin with a revision of the classification of the more valuable merchandise, and the rates exigible thereon. On account of the greatly increased value of commodities (in most cases the increase will be permanent) it is obvious their classification is now anomalous, and the rates charged seriously out of proportion to values, which is the established principle on which rates are based and fixed. This is convincingly demonstrated to the railways when claims arise; the current value bears no comparison to that of pre-war times; for instance, boots and shoes, drapery, earthenware, glassware, &c., have all increased from 100 to 300 per cent.; whisky, for which, in many cases, special rates were arranged with certain distilleries when the price was about 2s. 6d. per gallon, is now charged, when claims arise, at 32s. 6d. per gallon and upwards, an increase of about 1,300 per cent., both minus duty. (See later remarks regarding dutiable articles.) It will, of course, be clearly understood it is not suggested any increase should be made on general merchandise rates, *i.e.*, foodstuffs, raw material, mineral traffic, or any of the essential goods required by our industries, pivotal or otherwise; indeed, it is hoped and expected, by a more equitable adjustment of the rates, a reduction in favour of such goods might be effected.

It is a popular but mistaken notion

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that the monopoly granted by Parliament to railway companies confers on them almost unlimited powers. It is a delusion! Parliament is always jealous of the interests of the trading public. The powers granted are hedged about with many burdensome conditions, not the least being the adamantine law regarding rates, and their application to merchandise *ad valorem*, equitable to the traders and companies alike These restrictions, doubtless regarded by the traders as safeguards, are embraced under the Railway and Canal Acts and simply bristle with objections and limitations, responsibilities and liabilities, all of which operate against the carriers. These, along with the Board of Trade Regulations (which, however, are not objected to, although difficult and expensive to carry out) have increased working expenses enormously, all of which have to be met out of revenue, yet not a penny can be added to the merchandise rates. No other business, monopolistic or free, could successfully carry on under such inflexible conditions. They have all costing departments and regulate their rates accordingly, whether levied on manufactures or for services rendered, but railway companies are not allowed such freedom. Perhaps it is expected the advice given by *Punch* some years ago—How to work railways economically and profitably—holds good, "Knock off more trains and increase the space and tariff for advertisements at the stations!' The latter appears to be sound advice, as it is still the only tariff the railway companies can increase without an Act of Parliament. The time has come, we think, when railway companies should be granted a measure of reasonable control over their own fiscal affairs similar to that possessed by large public companies and bodies. A special department of the Board of Trade should be set up to deal with such matters, and after satisfactory proof has been adduced by the railway company or companies in support of the application for an increase of rates, an Order in Council should be granted them to advance the rates accordingly This would simplify and expedite procedure. It would also be economical, and the interest of all parties concerned would be safeguarded. It may be urged against the companies that they have been too slow to move in the past. Possibly the rigid conditions under which their business is hedged about has created that cautious spirit. Nevertheless much more might have been done by them to develop their resources in spite of these difficulties.

For instance, the Classification Book could have been drastically revised by transferring certain goods from a lower to a higher class, as many articles are now notoriously out of position therein. This book should be overhauled at once if only in equity to the companies themselves. In this connection, all articles subject to the Chancellor of the Exchequer's operations should be classified separately. It is to be expected that more and more goods of a valuable nature, luxuries, &c., will be included by the Chancellor in his list in future. This aspect of the question should, therefore, receive special attention, as it will become an important one for the railways in future. An increase of 10 per cent. by the Exchequer increases the value of the goods at once by that amount. It follows that the carriers' responsibility and liability are increased accordingly. It is not unreasonable, surely, that the rates should be advanced *pro rata*.

In the writer's opinion Budget changes, as distinct from other causes, should take effect automatically. It is essential the statutory requirements enforced on railway companies should be reviewed at times, say, every 10 years, to ascertain if they still serve the best interests of the country. The Carriers Act of 1830 is a case in point. Not a single article has been added to or taken from that list during the last 88 years; even when compiled it was apparently incomplete; for instance, it includes china but not porcelain; it includes glass stained and bent, but not show cases fitted with glass stained and bent, when the glass, if anything, is then more easily damaged. Typewriting machines, phonographs and records have since come into existence, &c.

The list is, in a word, antiquated; it should be overhauled and brought up-to-date.

Traffic Working.—This matter has already been dealt with elsewhere, so that it will not be necessary to go into it here at any length. The main object of the present control is to concentrate

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traffic in full wagon loads, reduce haulage, economise locomotive power and train mileage. By the adoption of the high-capacity "Standard" wagon and van in traffic working recommended by the writer in previous articles, great economies would be effected. These wagons have all the qualifications for economical working in a high degree, as distinct from the present type of wagon with its limited carrying capacity to its excessive tare weight, resulting in the duplication of trains and relative expenses. The present control is likely to continue in one form or another; probably the British railways will be arranged in large combines, or spheres of operation. The whole of the Scotch companies may be combined and operated under one control, similarly the English companies would be divided into three or four controls of equal size and volume of traffic. The experience gained under the present working conditions has been most useful. There are clear indications that large controls are both advantageous and, in many respects, more efficient, than small ones. With careful and judicious allocation and division of the traffic and the staff, utilising the shortest route in every instance (many anomalies still continue in this regard), and vans, wagons, sheets, ropes, &c., to continue to be common to all. With regard to the plant, the writer suggests it be provided by the companies both as to new stock and repairs *pro rata*, the large capacity wagon to be the standard, and might be made joint stock as between companies, or control, in which they work, same as coaching stock at present. But the more effective plan would be to put the plant entirely under one control, independent of the divisional traffic controls referred to; in a word, the plant should be nationalised in the best interests of the country. This arrangement would simplify and solve a great many difficulties among the companies, which are certain to arise in future. There are already indications of trouble on the subject. This department is too important to brook divided authority as hitherto.

The prospects of the British railways appear to be quite satisfactory, indeed, we might say, excellent; although the lines are old, they are, by no means, effete. There are, however, many districts still without railway connection, but light railways would serve. There are, alas! on the other hand, many other places with too many railways; a condition due entirely to what we describe as the mad competitive and canvassing period, which has saddled the companies with a debt of many millions, and this, unfortunately, must continue to be borne. Many of these branch railways were made, but never opened; beautiful stations, all complete, stand silent witnesses to this folly. The only good purpose they have served during these years has been that of storage for empty wagons, but now, *mirabile visu*, the giving up of their rails and sleepers to our gallant Army in France. This unexpected help from these dead railways may chasten our thoughts and make us more generous in our recollection of those who, in the latter part of the Victorian era, provided them, but for a purpose which was unfortunately never realised. The rails, however, have now been gloriously resurrected and that at a time when most needed. Surely in this we see again "that Divinity which shapes our ends rough-hew them how we will." Nevertheless, these dead railways are unquestionably a heavy legacy left to posterity. But the management of to-day and the future will, by adopting an enlightened, enterprising and energetic policy, overcome all the difficulties that beset their rugged path. It is a stupendous undertaking, but no greater than that awaiting many other industries, such as agriculture, coal mining, shipbuilding, shipping, &c., all of which depend on an efficient and well-organised railway service.

In the re-organisation of the railways now called for, it will be recognised that the old order has passed away; the conditions that obtained in pre-war times are gone for ever. New conditions arise and call for new organisation; new systems to deal with them. In the re-organisation of railways, the transition from the old to the new, now silently taking place, no consideration should be given to the old British conception—it ranks almost as a tradition—of traffic working, which apparently cannot lift itself out of the deeply-worn grooves it has got into. One of these is the small-wagon-system. This department—one of the most important—

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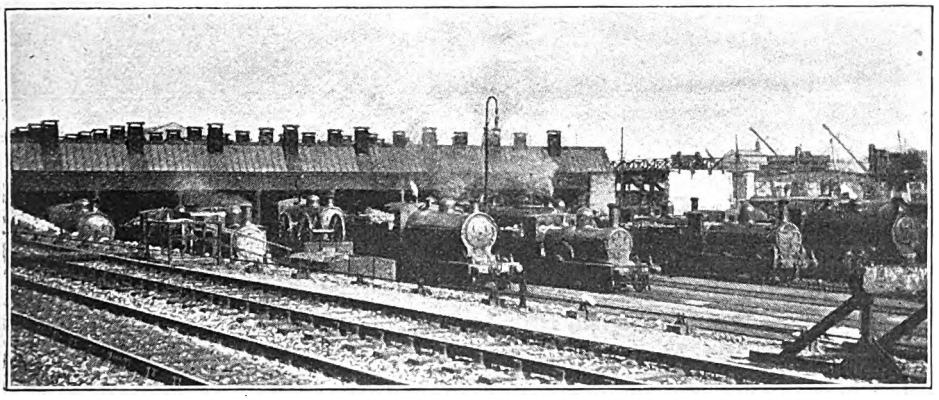
must be completely revolutionised and every modern improvement for manipulating traffic adopted. Large volumes of traffic in transit to long distances, already exist, for which the type of wagon and arrangements the writer advocates are eminently suitable; indeed, it is a libel on the British railwaymen to-day, than whom there are none better, because it implies they are incapable of coping and dealing with large volumes of traffic as economically and efficiently as in other countries. All the staff require are suitable wagons and more power.

Heavy train loads of Welsh coal are seen passing to Clyde ports and elsewhere almost daily, in what the Americans describe as "toy wagons," with a nett weight not exceeding 320 tons. In high-capacity wagons, the same engine would haul 450 tons net, and with a still more powerful engine, double that quantity could be dealt with. The economy effected in this department alone is obvious, apart from the greater safety of the stronger wagon.

Railway managers may complain that the facilities at the docks are not suitable, but they themselves are to blame for this limitation, as all these facilities were designed and made to suit the type of wagon they supplied and still adhere to. Let the railways begin the reform and all these facilities will be added to them in due course, but it is they who must make the first move. Let them do so now by intimating to all the authorities involved—dock, shipping, colliery, &c.—fixing a time limit, say 12 months after the declaration of Peace, when the change from the small to the large wagon system would come into operation.

Attention has been drawn in previous articles to many of the weaknesses and failures in traffic working, both in pre-war times and still unfortunately operating. This article, while repeating such, has at the same time indicated reforms and solutions of some of the difficulties; these will undoubtedly form the basis on which the great scheme of railway reform will eventually be carried out. In the re-organisation of the national industries, a great prospect—like the birth of a nation, the British railways will exercise a most important part in that development. May they be ready to do so when the time comes!

AN IRISH RAILWAY SCENE.



Photo] [*T. Grove White.*

GREAT SOUTHERN AND WESTERN RAILWAY RUNNING SHEDS, CORK.

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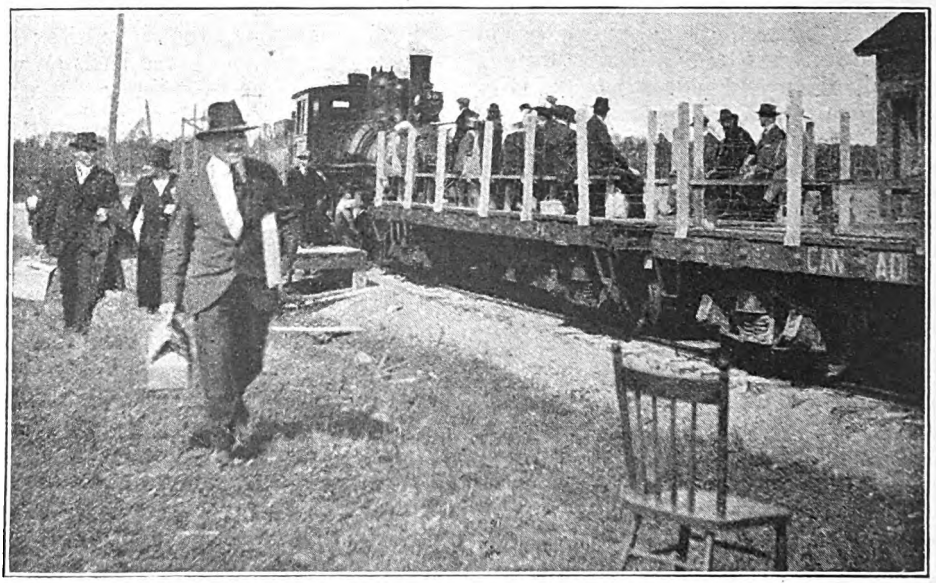
Some Civic Railway Excursions.

By NORMAN THOMPSON.

FROM time to time to time, during the brief Manitoba summer, the "City Fathers" of Winnipeg endeavour to stimulate the interest of its citizens in various works that they have in hand by the running of special day trips over railways constructed to facilitate their construction.

One such line, owned and operated by the City Light and Power Department, extends for a distance of 25 miles, and connects the power plant at Point du Bois on the Winnipeg River with the Canadian Pacific Railway at Lac du Bonnet.



ENTRAINING.
City of Winnipeg Light and Power Department Railway.

A journey over this railway discloses a number of unusual features, the more so in the case of those accustomed to British railway methods, and as it is situated rather off the track of the ordinary traveller, the following account may be of interest :—

The time of departure is 8.30 on a bright but distinctly "cool" September morn, and the first 60 miles lie over the Canadian Pacific Railway, whose engine and cars are utilised.

Between Winnipeg and Molson, "Eastbound" and "Westbound" trains take different routes, the former running *via* the Oakbank cut-off, 38.1 miles, and the latter traversing an additional 6.9 miles over the original main line through East Selkirk. Approaching Molson, a glimpse is caught of the tail end of the "Trans-Canada" vanishing into the bush *en route* to the West.

After a short wait at the station, a back shunt is made to clear the branch switch, and the journey is then resumed through a forlorn-looking country, well-wooded, but with few evidences of human occupation. Having covered 21½ miles, the small settlement of Lac du Bonnet is reached, comprising a population of 350, and this forms the terminal of the Canadian Pacific Branch.

Some passengers alight here, under the impression that a change of trains is

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necessary; this proceeding, however, proves to be premature, and they have to entrain again. On getting away the cry soon resounds through the cars, "All change at the next stop and walk across the bridge." This sounds interesting, but the application of the brakes quickly puts an end to anticipatory reflections, and within a short while, an attenuated procession of men, women and children, all laden with lunch baskets, is somewhat gingerly wending its way over a wooden trestle that spans the before-mentioned Winnipeg River; which, by the way, has no manner of concern with the city of the same name, but discharges to the north into Lake Winnipeg.

This structure was intended to permit of the ordinary train operation, but for some time it had been regarded dubiously by the trainmen, and it is said that the engineer acquired the practice of starting the locomotive and then jumping off, and following on foot, the fireman being stationed on the far side in readiness to board her.

However this may be, in due course it was decided that, with a view to being up-to-date, it was desirable to place in service a heavier locomotive. This policy was duly carried out, and on its first trip the new addition to the rolling-stock crashed through into the river, and traffic over the bridge is now restricted to a small gasoline car that is used for conveying baggage from one train to another. Having negotiated this obstacle in safety, and reached the opposite shore, one discovers a remarkable contrast between the vacated train, made up of standard passenger cars, and that which is in waiting.

The latter consists of three "flat" cars, wired all round for protection, and provided with planks running longitudinally above the sides for the accommodation of the passengers, who, however, supplement this effort by foraging around in the vicinity for round billets of wood on which to sit. Entraining proves to be a slow process, the gang-planks being steep and narrow, and the excursionists encumbered with packages containing "perishables" in great variety.

At length all is ready, the last individual has come to an anchorage more or less satisfactory; and the writer is fortunate in occupying a limited space on a plank placed transversely at the front end of the leading car. As the engine is located at the rear, and pushes for the whole trip of 25 miles, an excellent view is obtainable of the track, and also one is enabled to experience the penetrative properties of the autumn breezes.

The country now traversed is wild and open, and uninhabited for the most part, except by a small species of black bear.

At one point, however, an evidence of civilisation obtrudes itself forcibly, in the presence of a sturdy specimen of the domestic cow, standing uncompromisingly between the metals.

The brakeman signals with his hand to the engineer, who at once slows down, and all hands seize the opportunity for indulging their vocal capabilities.

For once it would seem that Stephenson's famous remark is to be discredited; however, just as the wheels are coming to rest the animal steps aside with rather a bad grace, and hopes of eventually reaching one's destination are revived.

Not long after the occurrence of this incident, an extensive expanse of water is seen occupying a great portion of the landscape, and into its murky depths the track vanishes from sight. Speed drops to a mere crawl, and a curious sinking sensation is experienced as the rails (already floating a little beneath the surface, being held by the splice plates) are depressed perceptibly under the weight of the cars. The water washes against the cars and a wit is heard to offer the suggestion that the line may be considered "in liquidation." All attempts to fill this dismal swamp have hitherto failed.

Shortly before reaching the terminal there is a turning "Y" as it is called, used in place of a turntable.

At Point du Bois there is a small station, also a concrete engine-house and a coaling stage.

The falls, dams and power-station are all of considerable interest, and the little community, consisting solely of employees and their families, enjoys an electric light installation.

The pushing process is evidently deliberately chosen as the most suitable method of progression, for the engine re-arranges its train for the return journey; being found once more at the rear.

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The little baggage car, to which reference has already been made, pursues the passenger train for 31½ miles from the bridge to Lac du Bonnet station, as it would be inconvenient to load up on the slope of a steep embankment. At Milner, the next station, there is a "meet" with the regular mixed train, and the brakeman runs ahead to set the switch for heading her into the siding, which is already occupied by a box car in process of unloading. As the warning is shouted the lumber-handlers awake to feverish activity, for the powerful headlight on the approaching engine is already illuminating the track with a dazzling glare. In a few moments the work is completed, the wagon drives off, lurching violently across the rails, and Number 208 pulls into the siding, gently pushing the box car in front until clear of the main line.

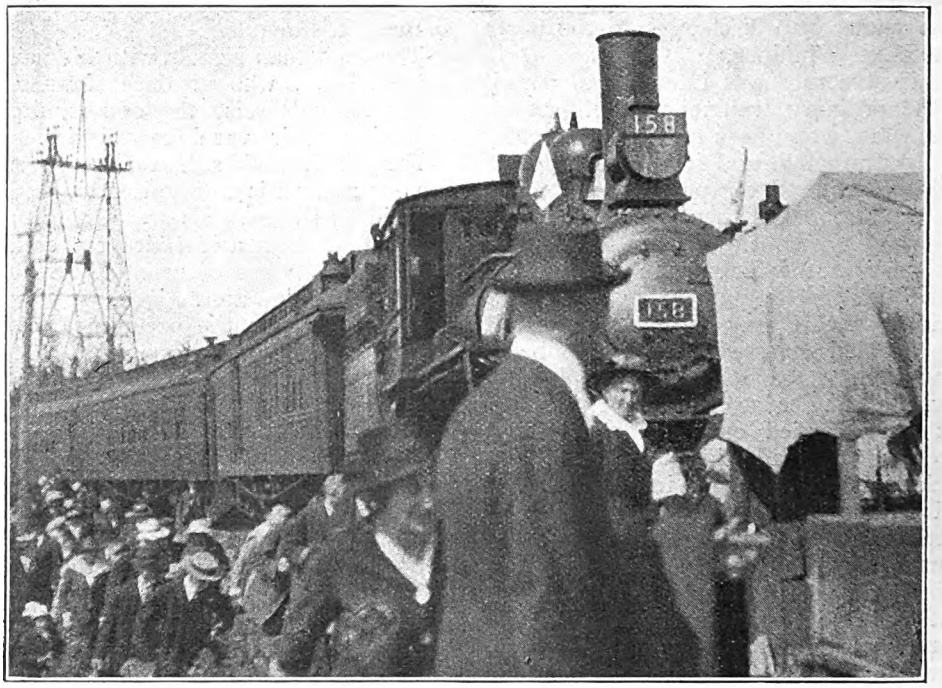
Darkness, which falls very rapidly in these regions has now come, and the journey is concluded without further incident, a total distance of 176 miles having been covered.

There is another more ambitious railway undertaking of the City, in connection with the newly-completed scheme for providing a soft water supply from Shoal Lake.

The line is nearly 100 miles long, extending from a point on the Canadian Northern Railway in the vicinity of Winnipeg almost to the Ontario boundary.

It is known as the "Greater Winnipeg Water District Railway," and whilst constructed for the purpose of hauling materials and supplies during the laying of the pipe line, will no doubt become a permanent means of developing the natural resources of the country through which it passes.

The excursion is again composed of Canadian Pacific Railway cars, but one of the City's locomotives is employed. It is booked out at the same time as a Canadian Northern Beach Excursion, and apparently over the same track as far as Paddington Junction, which arouses one's curiosity as to how this working will be carried out.



"ALL CHANGE, AND WALK OVER THE BRIDGE."
Note Baggage Car in Foreground.

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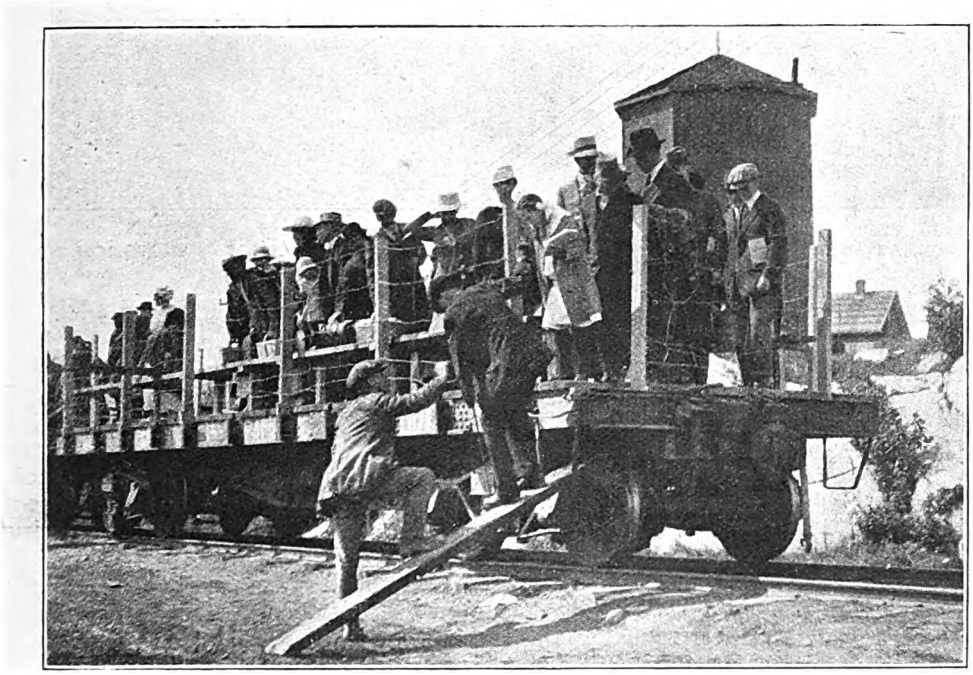
The discovery is soon made that the "Indian Bay" train will leave from one of the freight tracks at the rear of the Union Depot, and as this necessitates a long back shunt before the main freight track can be reached, the competing excursion, having a clear start from the passenger station via the high-level line, has ample time to draw ahead. While awaiting the arrival of the train the prospective passengers freely stroll about on the track.

Crossing the Red River by the low-level bridge, one notes the old St. Boniface station, now used by the Greater Winnipeg Water District Railway, followed by the connection from the "high" line and the new St. Boniface station, a neat and pleasing structure completed in 1913, but not at present in use. The Canadian Pacific Emerson line is next crossed on the level, and the Victoria Beach Subdivision of the Canadian Northern diverges to the left. On the right may be seen the Union Stockyards and extensive marshalling sidings at Paddington.

So far, the route has lain over the Rainy River Subdivision of the Canadian Northern Railway, forming a part of the main line to Eastern Canada, but 9½ miles from Winnipeg the City line commences and takes a general course parallel to, and between, the Transcontinental and Canadian Northern Railways.

At first a farming country is traversed, but this soon gives place to an interminable avenue of melancholy looking bush, each mile appearing to be the exact counterpart of the last.

Occasional stops are made to permit of inspecting the pipe line, and many passengers put in the time gathering flowers by the trackside. The engine bell tolls so many false alarms that little or no heed is ultimately paid it, and only the actual starting of the train brings the laggards hurrying to the respective car steps.



ALIGHTING AT POINT DU BOIS.

Nobody appears to either get damaged or left behind in this way, but it is impossible to refrain from wondering how such proceedings would be regarded by the British Board of Trade.

The scenery continues to exhibit the same dreary aspect hour after hour, until approaching the lake, when out-croppings of rock lend a little welcome variety.

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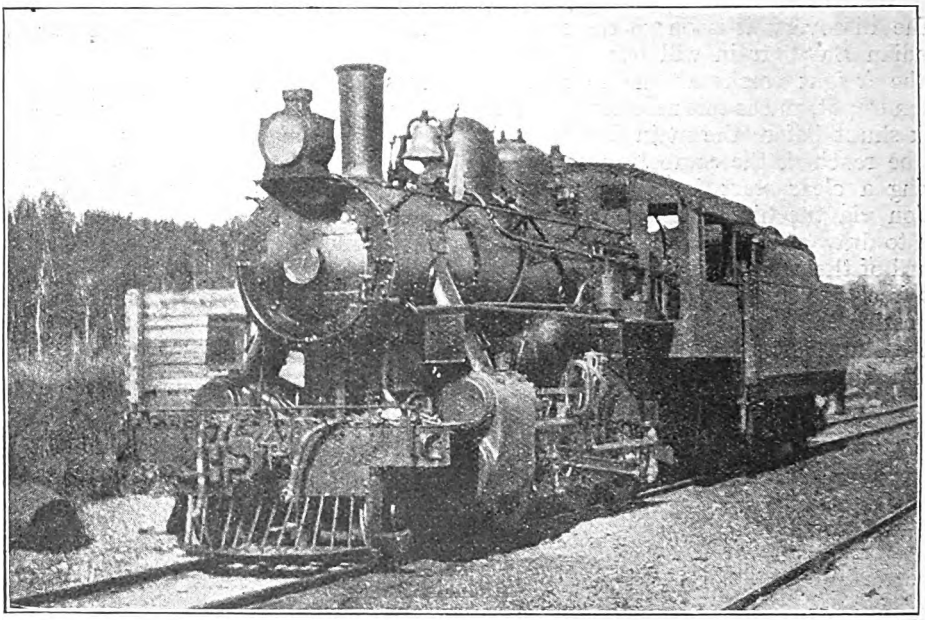

GREATER WINNIPEG WATER DISTRICT RAILWAY ENGINE, No. 7 AT WAUGH.

The station there is named "Waugh," after the Chairman of Commissioners, but the tickets read "Indian Bay," and there are in the vicinlty some curious Indian graves.

On the return journey, the train enters the Union Passenger Depot, and thus for once at any rate, the Canadian Pacific rolling-stock finds itself in the home of its rivals.

Unlike the Point du Bois line, the Greater Winnipeg Water District Railway publishes a regular time-table, showing a service of one mixed train, making the "Eastbound" and "Westbound" runs on alternate week-days. The intermediate stations number 10, excluding the point of junction with the Canadian Northern Railway. The excursions occupy about five hours, and the regular train, going East, 12 hours, and eight hours in the reverse direction, in covering the whole distance of 97 miles in the case of St. Boniface, and 98½ miles when running to and from Winnipeg.

The return excursion fare for both the Point du Bois and the Shoal Lake trips is one dollar, so that good value is given as far as travel-time is concerned.

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Lancashire & Yorkshire Railway Staff Changes.

MR. ASHTON DAVIES, M.B.E., who has been appointed by the Directors of the Lancashire and Yorkshire Railway to the position of Superintendent of the Line entered the service of that Company in 1890. Commencing in the Telegraph Department, where he gained an intimate and practical knowledge of that section. Mr. Davies was afterwards transferred to the Passenger Superintendent's Office, and subsequently became personal assistant to Mr. Chas. J. Nicholson, who at that time was Passenger Superintendent. This position Mr. Davies has held during the term of office of four Superintendents, and it is probably due to the conspicuous ability shown during that period that, at the comparatively early age of 44, he has been appointed to the high and responsible post of Superintendent of the Line.

Mr. ASHTON DAVIES,
Superintendent of the Line,
Lancashire & Yorkshire Railway.

During the period Major Arthur Watson, C.B.E., has been Superintendent of the Line Mr. Davies has assisted him in the carrying out of many important schemes and developments, including the establishing of a system of train control which has proved most successful.

Mr. Davies attended the lectures given at the Manchester University on Railway Economics and obtained one of the first scholarships given by the directors of the Company.

When the School of Signalling was instituted by the Lancashire and Yorkshire Company to give facilities to members of the staff to extend their knowledge of railway working, Mr. Davies was appointed to the position of Lecturer, and he has taken a keen interest in the development of the object for which the school was established. That this has been achieved is proved by the fact that for the session 1917–18 over 1,700 students were enrolled.

The promotion of Mr. Davies is very popular with the staff, all grades of which he came into contact with during the lectures at the School of Signalling.

The appointment is an assurance that the progressive policy of the Lancashire and Yorkshire Railway will be maintained.

The retirement of Mr. S. Hauxwell Assistant Superintendent of the Line Lancashire and Yorkshire Railway, i announced. He began his railway careei in 1867, and in 1875 was appointed Stationmaster at West Vale (Yorkshire), being at that time the youngest stationmaster on the line. Mr. Hauxwell has

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had a wide experience of railway administration during his 51 years of service, having filled the position of Stationmaster, Goods Agent, District Goods Superintendent, Assistant Goods Manager, Goods Trains Superintendent and Assistant Superintendent of the Line. During the period of the War he has been Acting Superintendent of the Line in the absence of Major Arthur Watson, O.B.E., whose duties on the Railway Executive Committee necessitated almost constant attendance in London. In 1901 Mr. Hauxwell was a member of a Commission sent out to the United States to investigate certain phases of the American practice in the working of goods and mineral traffic, and was one of the pioneers of the tonnage system of loading trains. During the time he has been Assistant Superintendent of the Line Mr. Hauxwell has given special attention to the development of the enormous pleasure traffic from the industrial towns of Lancashire and Yorkshire to the Blackpool Coast, Southport and the Isle of Man.

Mr. S. HAUXWELL,
Retiring Assistant Superintendent of the Line, Lancashire & Yorkshire Railway.

Mr. T. W. ROYLE,
Appointed Assistant Superintendent of the Line, Lancashire & Yorkshire Railway.

Mr. T. W. Royle, M.B.E., has been appointed by the directors of the Lancashire and Yorkshire Railway to be the Assistant Superintendent of the Line at the early age of 36.

He entered the service in August, 1898, in the trains section of the Passenger Superintendent's Office, and was transferred to the personal staff of the Passenger Superintendent in 1900, in which position he remained until October, 1914, when he was appointed Confidential Asistant to Major Arthur Watson, O.B.E., then Superintendent of the Line, in connection with the Railway Execuive Committee in London. Mr. Royle was created a Member of the Order of the British Empire in January, 1918, for services rendered to the War Office.

The following appointments have also been made :—

Assistant to Superintendent of the Line—
Mr. David Halliwell.
Mr. George Hawkins.

District Passenger Superintendent (Central District)—
Mr. W. H. Pearson.

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The Why and the Wherefore.

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-first annual edition of which is now out of print, but the new edition for 1919 is in preparation and it will be published in April next, price 5s. net, by post 5s. 6d. Every reader who desires a copy should order at once. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use.*

Locomotive Dimensions.

Reference to the conditions at the head of these columns will make it clear that we do not undertake to give the dimensions of locomotives in answer to queries. As a special case the dimensions of three types asked for by the undermentioned querists are detailed herewith, but this must not be regarded as a precedent. In fact we must ask intending questioners carefully to read the rules and strictly to abide by them.

London and South Western Railway 4-6-0 (tender) Nos. 486–489: cylinders, 21 in. by 28 in.; driving wheels, 6 ft.; heating surface, tubes 1,716 sq. ft., firebox, 167 sq. ft., Robinson superheater, 371 sq. ft., total, 2,254 sq. ft.; grate area, 30 sq. ft.; working pressure, 180 lb. per sq. in; weight of engine, adhesion, 58 tons 12 cwt., total, 79 tons 4 cwt.; weight of tender, with 5200 gall. of water and 7 tons of coal, 57 tons 8 cwt.

London, Brighton and South Coast Railway 2-6-0 (tender) Nos. 337–346: Cylinders, 21 in. by 26 in.; driving wheels, 5 ft. 6 in.; heating surface, tubes, 1,156 sq. ft., firebox, 139 sq. ft., superheater, 279 sq. ft., total, 1,574 sq. ft.; grate area, 24·8 sq. ft.; working pressure, 170 lb. per sq. in.; weight of engine, 63½ tons, tender, 41½ tons. Type originated in 1913.

Midland Railway 4-6-4 (tank) Nos. 2100-2107: Cylinders, 20 in. by 26 in.; driving wheels, 6 ft. 3 in.; heating surface, total, 1,446 sq. ft.; grate area, 25 sq. ft.; working pressure, 160 lb. per sq. in.; length over buffers, 47 ft. 8 in.; weight in working order, with 3 tons of coal and 2,200 gall. of water, 90 tons.

[Reply to ALFRED R. CRYER, C.L.B. and L.B.S.C.]

4-4-2 and 4-6-0 Locomotives.

There are now 293 4-4-2 express tender locomotives in this country, apportioned as follows: Great Northern Railway, 116; North Eastern Railway, 72; Lancashire and Yorkshire Railway, 40; Great Central Railway, 31; North British Railway, 20; London, Brighton and South Coast Railway, 11; and Great Western Railway, 3. The three last-mentioned are the famous French compounds: the Great Western Railway had a further number of 4-4-2 engines at one time, but subsequently converted them to the 4-6-0 wheel arrangement. As to 4-6-0 tender locomotives, the London and North-Western Railway heads the list with 425, the Great Western Railway having 123, the North Eastern Railway 65, the Caledonian Railway 51, the Great Central Railway 45, the Great Eastern Railway 40, the London and South-Western Railway 38, the Highland Railway 34, the Lancashire and Yorkshire Railway 20, the Glasgow and South-Western Railway 19, and the Great Southern and Western Railway 6; total, 867. This number is in course of being increased as the Great Central, London and South-Western and Highland Railways are now building 4-6-0 engines. The totals of 4-6-0 locomotives include large numbers of mixed traffic engines—170 of the London and North-Western total, for example, consist of 5-ft. engines mainly employed on goods service—but practically

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all the locomotives enumerated take a share in passenger operation when required.

[Reply to V. McCURDY.]

Great Western Railway "Stars" *v.* London and North-Western Railway "Claughtons."

Total weights of these engines in working order are 75 tons 12 cwt. and 77 tons 15 cwt.; with tenders, 115 tons 12 cwt. and 116 tons 15 cwt.; and total lengths over buffers, 64 ft. $1\frac{3}{4}$ in. and 63 ft. $4\frac{3}{4}$ in. respectively. Nominal tractive effort at 80 per cent. working pressure of the "Stars" with 15-in. cylinders is 26,400 lb. and with $14\frac{1}{4}$ in. cylinders, 23,600 lb.; of the "Claughtons" with 16-in. cylinders it is 23,000 lb. and with $15\frac{3}{4}$ in. cylinders, 22,300 lb. We cannot undertake to answer further queries of this character—see reply under heading "Locomotive Dimensions."

[Reply to "WIDNEY MANOR."]

"Single Driving" Locomotives.

The only express locomotives remaining in this country with single driving wheels number 95 on the Midland Railway, 20 on the North Eastern Railway, 6 on the Great Central Railway, and 1 on the Caledonian Railway (the last-named being used exclusively for working directors' and officers' special trains), total 122. It is only during recent years that the last remaining engines of this wheel arrangement in the Great Western, Great Northern and Great Eastern Railways have been broken up. Your second question is not sufficiently explicit to be capable of an answer.

[Reply to E.S.H.]

Tractive Force of Compound Locomotives.

In the case of compound locomotives we quote the "Locomotive Engineer's Pocket Book" to the effect that "tractive force is calculated on the basis of the mean pressure being referred to the diameter of the high-pressure cylinder. For 'cut-offs' of 30 to 40 per cent. in the simple engine, the corresponding 'cut-offs' in the compound are 50 to 60 per cent." Following is a table showing the percentages of boiler pressure which may be taken as "mean" pressure for ratios of piston area of from 2 to 2·9.

[Reply to ARTHUR HEWITT.]

District Railway Cars.

One car only, on the Metropolitan District Railway, has been painted English Lake outside and fitted with green curtains. This has been done as an experiment and in order to see whether this colour could be adopted in place of the familiar Post Office red which is the standard hue on the District line. The scheme has not been approved. The car is in no other way different from the other cars and we do not understand how you arrive at the conclusion it is more comfortable.

[Reply to "DISTRAIL."]

Lancashire and Yorkshire Railway Expresses.

Photographs of Lancashire and Yorkshire express trains frequently appear in the RAILWAY MAGAZINE (*vide* pp. 225, 310 and 311 of the last volume), together with frontispiece plates from time to time, as opportunity offers. You can obtain full information as to all Lancashire and Yorkshire express train services by reference to "Bradshaw's Guide"; we have not space to give you all the particulars you require in these columns.

[Reply to V. McCURDY.]

South-Eastern and Chatham Railway Mileages.

Distances from Victoria to stations on the old South-Eastern main line, *via* Bickley and Orpington, are in all cases 1 mile, 10 chains further than from Charing Cross. Similarly from Victoria to stations on the old London, Chatham and Dover Railway main line the distances are 1 mile, 10 chains further than from Charing Cross, *via* Chislehurst and St. Mary Cray.

[Reply to "AIRFORCE."]

Flat-bottomed Rails.

See reply to E.E.C. in December issue. Further inquiries in this matter convince us that whereas the flat-bottomed track is cheaper, for the same weight of rail, than the bull-head track in its *initial* cost, in *ultimate* cost the advantage lies materially with the latter, of which the rails are capable of greater wear, weight for weight, the cost of maintenance is generally less, and the final scrap value is higher, than in the case of the former.

[Reply to Major H. J. COXHEAD.]

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Stone Obelisk near Merstham Tunnel.

This denotes the limit of the Metropolitan Police area at this point. It is similar to many others placed along the boundaries of the area controlled by the Metropolitan Police. Incidentally we have been informed that at one time coal dues were collected at the spot, but this we cannot confirm. Perhaps some RAILWAY MAGAZINE readers possessing local knowledge may be able to do so.

[Reply to WM. E. BRIGGS.]

A Photographic Difficulty.

Surely you cannot really imagine that it is possible for a locomotive to pursue the even tenor of its way with a broken crank or connecting rod? The rods to which you refer in the case of the South Eastern and Chatham Railway express engine depicted on page 19 of the July issue are brake-rods, and this is their normal position on large numbers of the 4-4-0 locomotives of that company.

[Reply to "LUCK OF EDENHALL."]

100-mile Runs on the London and South-Western Railway.

Prior to the war the 4.10 p.m. express *ex* Waterloo, and the 9.8 a.m. and 2 p.m. expresses *ex* Bournemouth (Central) covered the 108 miles between Waterloo and Bournemouth without intermediate stoppage in 2 hours, while the 2 p.m. *ex* Waterloo ran non-stop to Christchurch, 104¼ miles, in 117 min. These runs are for the present discontinued.

[Reply to C. C. J. SIMMONDS.]

The Severn Tunnel.

We cannot say we see the remotest possibility of a high level route to South Wales ever being built in substitution for the Severn Tunnel. The cost, especially of bridging the estuary, would be colossal, and the interest on it would far more than swamp the saving effected by doing away with the comparatively high cost of maintaining the tunnel and operating its steeply-graded approaches.

[Reply to "SATELLITE."]

Pullman Cars.

We are officially informed there is no foundation for your statement that you had seen the Pullman car "Galatea" working on an officers' leave train on the South Eastern and Chatham Railway. You must have been mistaken. Car "Galatea" was built for the Metropolitan Railway and has never left that line. It is still running regularly between London and Aylesbury.

[Further reply to HAROLD CHASE.]

Dual-fitted Locomotives on the North British Railway.

Of the two English partners of the North British Railway one—the North Eastern Railway—employs the Westinghouse brake, whereas the other—the Midland Railway—is a user of the Vacuum brake. On this account it is necessary for the North British Company to fit a number of its engines with both types of brake.

[Reply to W.A.M.]

London, Brighton and South Coast Railway Engine "Brighton."

In addition to the 0-6-2 tank engine, No. 158, *West Brighton*, we are reminded by Mr. W. Briggs that a further engine of the same wheel arrangement was built by Mr. R. M. Billinton in 1904, numbered 587, and carried the name *Brighton*, in substitution for the original "Terrier" tank of that name.

[Further reply to K. PATON.]

Some North Eastern Railway Locomotive Queries.

North Eastern Railway engines Nos. 2191 and 2192 belong to series 2173–2192 of the small 0-6-0 tank engines (class E 1), while No. 2193 is the first of the 2193–2212 series of three-cylinder 4-4-2 express engines (class Z). Boilers of the latter are 5 ft. 6 in. diameter by 15 ft. 10½ in. long.

[Reply to M.H.]

The Heaviest Locomotive.

After the Great Western Railway *Great Bear*, the heaviest British tender engine we can trace is the rebuilt London and South-Western Railway 4-6-0 No. 335, weighing in working order 79 tons, 12 cwt. Next come the 482–491 series of the same company, weighing 79 tons, 4 cwt. These weights are of course without tenders.

[Reply to ARTHUR HEWITT.]

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London and South-Western Railway Gradients.

Between Winchester and Southampton the line falls at 1 in 233 to 260 (average 250) from Winchester to mile-post 72¼; thence at 1 in 614–266–517–562 to mile-post 73⅜; 1 in 526 to 75⅜; 1 in 400–469 to 76⅞; and is practically level from there to Southampton.

[Reply to "SLIDE-VALVE."

0-4-4 and 4-4-0 Engines, Metropolitan Railway.

We are informed that all the 4-4-0 tank engines of above company have now been fitted with "pop" safety-valves, and 50 per cent. of the 0-4-4 tank engines also, the remainder of the latter having Ramsbottom safety valves with the levers carried into the cab.

[Further reply to "MET."]

Letters on Great Northern Railway Locomotives.

The letter on the vacuum pipe indicates the load classification. The loads for the 0-6-2 and 0-6-0 saddle tanks are the same. We are not aware there is a small letter "K" under any of the number plates of these engines.

[Reply to R. G. WITT.]

Chelmsford Goods Yard, Great Eastern Railway.

On the incline leading to this yard the grade is 1 in 50, and special incline brakes are employed on all trains to and from the yard, with additional ordinary brakes when the loads render them necessary.

[Reply to "MUMROBIC."]

Locomotives of the Midland Railway.

We know of no book dealing with the locomotive history or the present locomotive stock of this company. No Midland engines at present bear names.

[Reply to ALFRED R. CRYER and PNR. H. WARD.]

Footplate Lamps.

A Great Western Railway engine carries a footplate lamp with clear glass in front for observing the water gauge. The sides are fitted with red and green glass respectively for signalling purposes.

[Reply to "PECKETT."]

Superheater Compound Express Engines, Midland Railway.

Following are the numbers of the 4-4-0 compound engines of this company now superheated: 1000–1004 inclusive (the original Johnson compounds) and 1040.

[Reply to E.H.]

Superheating on the London and South-Western Railway.

Rebuilt engines of the 443 6 ft. 7 in. 4-6-0 series on the London and South-Western Railway are equipped with the Eastleigh superheater.

[Reply to G. C. MARSH.]

Condensing Apparatus.

Engines Nos. 1020 and 1848, Great Eastern Railway, are not fitted with condensing apparatus, nor to our knowledge are any express engines in this country so fitted.

[Reply to "MUMROBIC."]

Locomotive Names.

A study of the rules at the head of these columns should make it clear to you that we do not undertake to give lists of locomotive names.

[Reply to W. E. BENHAM.]

Midland Railway Locomotives.

We cannot trace the reference to which you refer. There are no detailed lists published of the locomotives of this company.

[Reply to A. FAWSSETT.]

The Tay Bridge.

Length of the up main platform at Tay Bridge Station, Dundee, is 419 yards, and the length of the Tay Bridge, including approaches, is 2 miles 380 yards.

[Reply to "TAY BRIDGE."]

A Baffling Query.

It is quite impossible for us to identify "that clanking noise" you have often "noticed on passenger engines" from such exceedingly scant particulars.

[Reply to G. C. MARSH.]

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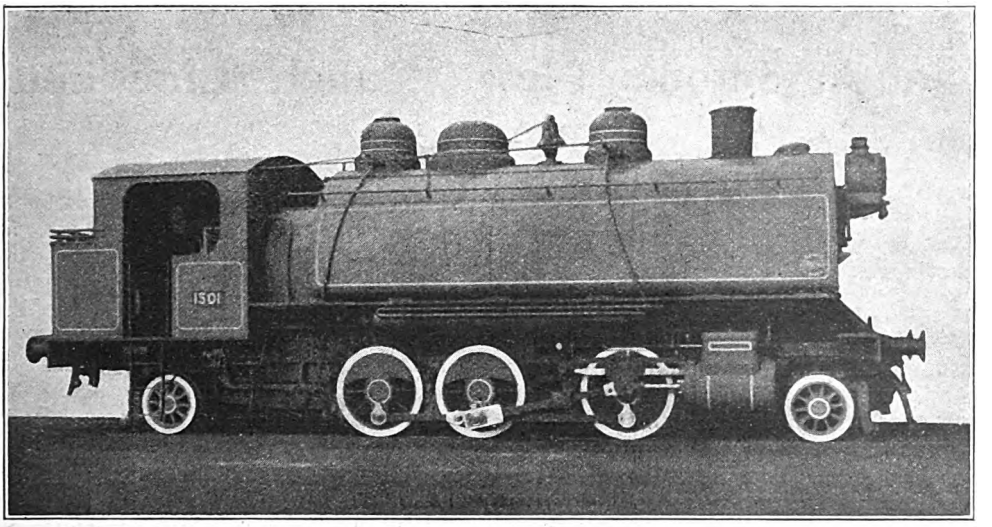
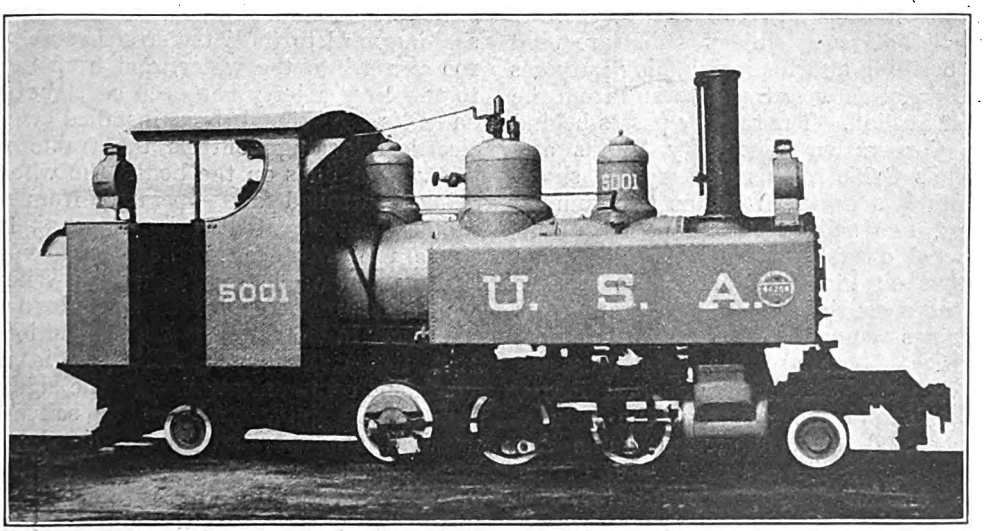


BALDWIN 2-6-2 TYPE LOCOMOTIVE FOR THE BRITISH GOVERNMENT.

Baldwin Locomotives for the British and American Governments.

THE locomotives illustrated have been built for the British and American Governments. The British engine is of standard gauge, and that for the United States is for a gauge of 1 ft. 11⅝ in. Both have the 2-6-2 wheel arrangement with outside cylinders. The British locomotive is fitted with a saddle tank, but the other with side tanks. The proportions differ considerably.

	British Engine.	U.S. Engine.
Cylinders ..	17 in. by 24 in.	9 in. by 12 in.
Working pressure	180 lb.	178 lb.
Tubes, diameter	2 in.	1½ in.
Number	211	83
Length	13 ft. 6 in.	8 ft. 2 in.
Heating surface, firebox ..	105 sq. ft.	28.4 sq. ft.
Tubes	1,482 sq. ft.	263.5 sq. ft.
Total	1,587 sq. ft.	291.9 sq. ft.
Grate area ..	14.8 sq. ft.	5.6 sq. ft.
Weights total ..	68 tons 6 cwt.	15 tons
Tank capacity ..	2,100 Imp. galls.	476 U.S. galls.
Fuel	2.75 tons	15 cwt.



BALDWIN 2-6-2 TYPE LOCOMOTIVE FOR THE AMERICAN GOVERNMENT.

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Southampton's New Branch Line and Train Ferry.

ALTHOUGH train ferries have been in existence in America and the north of Europe for a considerable time, the one at Southampton and another war-time construction at Richborough in Kent are the first in England. Both have been of immense service in the conveyance of war material from all parts of Britain to the Continent.

Empty ambulance trains and vehicles of various descriptions have travelled over the British railways, run on to the ferries and been taken across the narrow seas or the Channel to French ports where, owing to the rail gauge being for all practical purposes the same, they have joined the French railway systems and have been hauled to their various destinations in France without change or transhipment. In like manner empty wagons, derelict motor lorries, &c., have been brought back from France to England.

The new railway leaves the Down Bay line of the London and South-Western Railway at Southampton West Station, the connection being operated from the "B" ground Frame. For the first 100 yards it is a single line, but then divides into two running roads which continue throughout to the jetty, a distance of over a mile. At the West Station end, leading from the running roads, there is a series of seven sidings which are used for berthing and for marshalling purposes in connection with traffic to and from the West Station. The railway passes behind the Corporation Electricity Works and Pirelli's Cable Works skirting the shore. At Pirelli's works, from the two running roads, two siding loops have been constructed capable of holding trains of 44 wagons on Pirelli's side and 40 wagons on the river side. Here also are scissors crossings connecting the two running roads. These are the only crossings between the West Station and the Ferry, and this and the fact that the railway is operated from a ground frame are weaknesses in the general lay-out of the line. A siding has been constructed, and a connection made from the running road into Pirelli's works. This at present is operated by the military. About 100 yards beyond this a fine marshalling yard, on the gridiron system, and sidings have been constructed capable of holding about 500 wagons. There are twelve roads which diverge from the two running lines, and further on converge again into the two roads leading to the ferry. Eight berthing sidings also lead out from this marshalling yard capable of holding about 200 wagons, while a brick-built engine shed, with accommodation for two locomotives, has been erected at the north end. The Headquarter Offices and workshops of the I.W. and D. are situated here. Four large oil tanks of several thousand gallons capacity each have been built on the river front for supplying oil fuel to the Ferry T.F. 2.

At the southern end of the headquarters' marshalling yard there is a connection to the Town Quay along the public road. This has been used very extensively to convey traffic to and from a service of barges which has been running from Southampton to France. There are ten of these barges, four of which are self-propelled by steam and six which have been towed across the Channel by tug boats.

The stone embankment from the marshalling yard to the jetty stretches about 100 yards into the water, and from here to the ferry a jetty has been constructed on piles. A signal box installed with electrical locking controls the traffic to the various lines on the boats, the whole being controlled and operated from a cabin on an elevated bridge some 35 ft. above the entrance to the ferry, overlooking the whole of the work. When the boats are being loaded or unloaded the officer in charge gives his instructions from this cabin, from which he is in telephonic communication with the signal box on the jetty. A pair of scissors crossings are operated from the signal cabin, so that wagons can be marshalled without difficulty to the various roads on the two boats which are now running,

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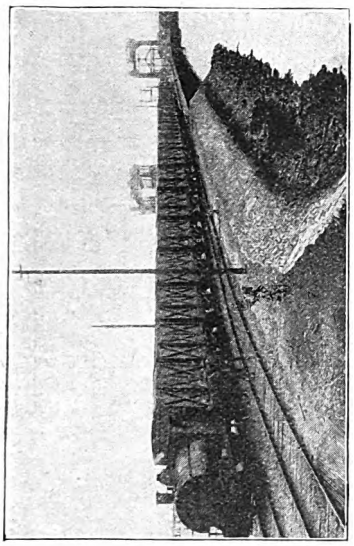
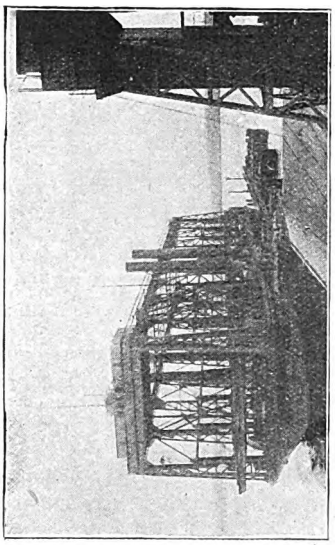
and for which separate berths have been provided.

The first ferry boat left Southampton for France November 13, 1917. This boat, known as T.F. 1, was after a few trips replaced by T.F. 2, a boat built specially at Birkenhead and driven by oil fuel. She is in service between Southampton and Dieppe. This boat has four sets of rails, with stop blocks at each end. The railway vehicles are pushed on from the jetty to the running lines on the boat by means of a locomotive engine, a connecting bridge being raised or lowered to the boat according to the tide. Vehicles are chained and scotched to the deck. Approximately 20 minutes is occupied in unloading the incoming and reloading the outgoing vehicles.

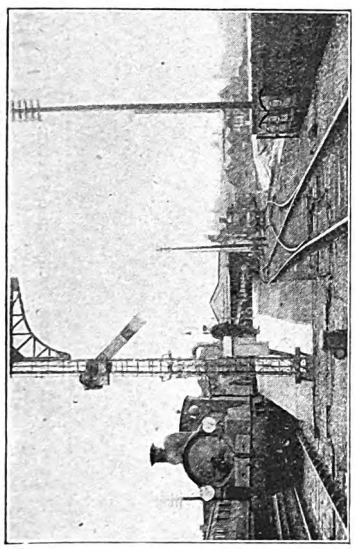
The other boat, known as T.F. 4, is steam-driven, and runs between Southampton and Cherbourg. Built at New-



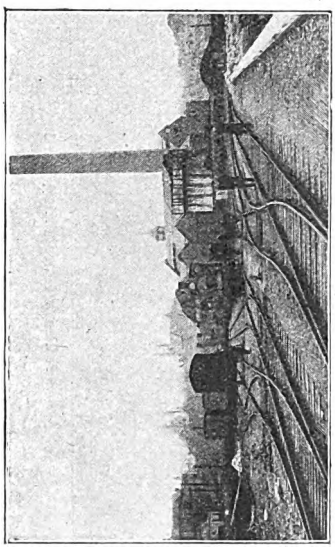
Backing Train to Ferry.



T.F. 4 and 3-Track Berth.



Ferry Line Junction, West Station.



L. & S.W.R. Marshalling Yard.

SOUTHAMPTON'S NEW BRANCH LINE AND FERRY.

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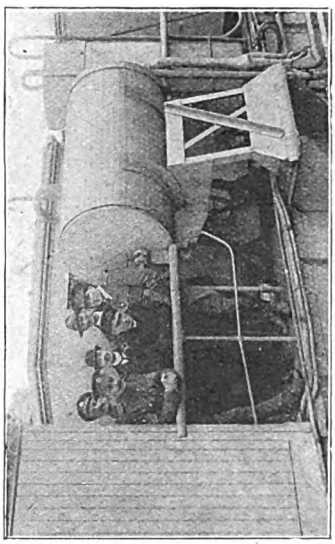
castle-on-Tyne for the Canadian Government, she had been occupied in conveying traffic across the St. Lawrence from Quebec in connection with the Canadian Pacific and Inter-Colonial railroads. Her first trip from Southampton to France was made on November 6, 1918. T.F. 4 has only three tracks and will take 33 common user waggons, whereas T.F. 2 will take a total of 54 wagons in all as a load.

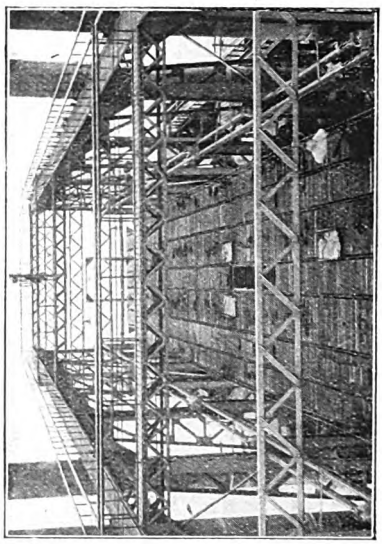
Both boats are of shallow draft, ranging from 8 ft. to 12 ft., according to their loads, and their speed is from 12 to 16 knots. They load at Southampton, discharge at Cherbourg or Dieppe, and are back to reload at Southampton in 25 hours, provided the weather and tide permit.

The RAILWAY MAGAZINE is indebted to the London and South-Western Railway for the foregoing particulars and for the accompanying illustrations.

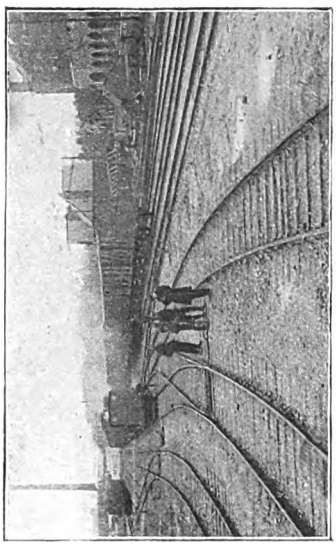
SOUTHAMPTON'S NEW BRANCH LINE AND FERRY.



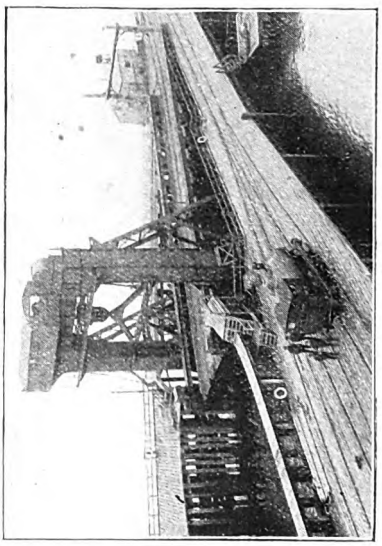
On Captain's Bridge, T.F. 4.



T.F. 4 from Captain's Bridge.



Military Marshalling Yard.



Loading Bridge and Berths.

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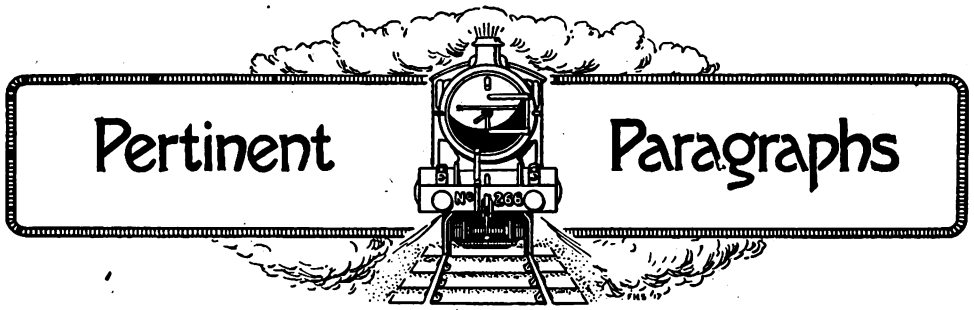

Railway Labour Troubles.

Since the signing of the Armistice, on November 11 last, industrial unrest has been one of the most disquieting features of the times in which we live. The war was won by all classes uniting in its prosecution, and in order to reap the benefits of the peace, harmony and concord are among the first essentials. That railwaymen should have their share in whatever betterment to Britain follows the war is a right that cannot be gainsaid, but as it has been pointed out by Mr. J. H. Thomas, the General Secretary of the National Union of Railwaymen, no section of the workers engaged in the railway industry must assume that they can hold the State to ransom at any time. Certainly no good may be expected to accrue to railwaymen as a class when the general public is inconvenienced and exasperated as was the case during the recent sectional strike on the London Underground Railways.

That the Railway Clerks' Association should obtain the recognition it desired, was generally welcomed by the public. The affairs of this union, which embodies about 75 per cent. of the clerical railway workers in the United Kingdom, have always been conducted with reasonableness and a sense of responsibility. It possesses a very able general secretary in the person of Mr. A. G. Walkden, who had he not chosen trade unionism as a career and had remained in the railway service would have made a very capable officer of high rank. Under Mr. Walkden neither sporadic strikes nor the intimidation of clerks or officers in supervising positions are at all likely to take place, but it is for the association to frame its rules in such a way that it becomes impossible for any ordinary member, or section of members, to prove unworthy of the recognition now given their union.

The general question of railway labour troubles was dealt with by the Prime Minister on the recent opening of Parliament and his words are worthy of careful consideration by all concerned. Mr. Lloyd George referred to the interdependence of the different industries. A great increase in the cost of some essential ingredients, like coal or transport, might easily destroy the country's chance of restarting the great export industry. A little change this way or that might give the trade to someone else. Four shillings a ton on coal, or shillings added to some other ingredients, whether shipping or other transport, or in some other way, might deprive us of hundreds of millions of trade in all parts of the world. What would the miners gain by that in the end? It was a great mistake to imagine that there was an inexhaustible reservoir of profit that could be dipped into at any moment without burdening any trade or business. There was no better illustration that the railways. At the beginning of the war they were making a profit of £50,000,000, which produced a dividend of under 4 per cent. That was not a very extravagant return for capital, a great deal of it invested by small people. It was not invested in big sums as a rule. What had happened since the war? Owing to increases in one thing or another, in wages, curtailment of the hours of labour and increased cost of material, £90,000,000 had been added to the cost of running the railways. Where was the fund of profit there? It had all gone. Who was to make it up? The first-class passenger would not produce much if his fare were to be doubled or trebled. Every railway manager knew that. We had to get it from the consumer in some way or other—from the third-class passengers, goods and food. That was the only way to get it. He wanted every section of the community, when it puts forward demands, to bear these essential facts in mind, that all these demands were passed on to someone else and that there was a stage where if you passed them on they crowded on top of some poor industry that could barely march now, and it was crushed. That meant unemployment for somebody.

The Cologne Express.

Last December (writes "Second Army") as soon as the restoration of railway communication permitted, there was established

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a daily train between Boulogne and Cologne, for the use of officers travelling between the base and the army of occupation. Ambulance trains were taken for rolling-stock, so that passengers can sleep and eat in comfort; and the time-table allows 25¼ hours for the journey of about 325 miles. Not a fiery speed, according to former standards, but at any rate better than the five days which troop trains are alleged to take by those who survive the journey.

The following is the route taken and the booked stops: Boulogne, Etaples, Montreuil, (for G.H.Q.), St. Pol, Arras, Douai, Somain, Raisnes (for Valenciennes), Mons (via Luttre to), Charleroi, Namur, Andenne, Huy, Seraing (for Liege), Pepinster, Herbesthal, Aix-la-Chapelle and Düren. The departure times are 19.30 from Boulogne and 4.46 (a characteristic German touch this!) from Cologne. Each train is composed of 15 to 16 English ambulance coaches, each of about 29 tons tare weight. A German engine is employed as far as Herbesthal and a British Railway Operating Division engine thence to Boulogne, the same engine often working right through.*. The gradients are mostly easy, the only considerable banks being the well-known one between Boulogne and Etaples, the Dainville bank just west of Arras, and the short incline west of Aix, on the last two of which bank engines are employed. As the normal running speed is about 30 m.p.h., there is a large margin for delays; and when these happen not to occur, long periods have to be spent at intermediate stations waiting for time.

From Boulogne to Arras and again from Charleroi to Cologne (which forms part of the old Paris-Berlin main line) the road is in good condition, particularly the latter section which seems to have been well maintained by the German administration. But across the 60 miles or so of more or less ruined country the road-bed is still poor, and there still remain one or two bits of single line. The worst difficulty, which is the cause of most of the delays complained of by the demobilisation authorities, is that between Etaples and St. Pol the line was formerly only a country branch, which has indeed been double-tracked during the war, but is not provided with proper siding accommodation, nor have the sidings through the devastated area yet been relaid. Thus it is often impossible for many miles to shunt a goods train to allow a passenger train to pass it, and the latter must take its turn. As the goods trains are very frequent and heavy, delay to quicker trains is practically unavoidable. It cannot, however, be denied that delay to British traffic is aggravated by the undue precedence often given by French signalmen to their own trains.

Cologne station does not seem to have suffered from British air raids; at any rate no damage is visible to the casual observer. But one opens one's eyes at the sight of a Great Western engine at work in the heart of the Rhineland.

* Most trains between the bases and the rail-heads are now worked by the same engine throughout; a relief crew being carried on each train.

Another Honour for Mr. Alfred Aslett, J.P.

RAILWAY MAGAZINE readers are well aware of the long and honourable railway career of Mr. Alfred Aslett who last year retired from the dual position of secretary and general manager of the Furness Railway. The various presentations made at his retirement and the general acknowledgment of the notability of his life and work were duly dealt with in these columns. But there has been more to follow, for Mr. Aslett has been honoured in London by the Anglo-American Oil Company, who have presented him with his portrait painted by the well-known artist, Mr. Arthur T. Nowell. The recipient was also entertained at luncheon at the Savoy Restaurant. This high compliment to Mr. Aslett is a recognition of his services in providing facilities at the port of Barrow for the reception and storage of petroleum spirit in bulk. This was only another evidence of the enterprising management of Mr. Aslett in endeavouring to improve the business of the port, of which the Furness Railway are the Harbour authorities, and the facilities he was able to afford to the Anglo-American Oil Company have no doubt been mutually advantageous. The portrait painted by Mr. Arthur T. Nowell is a very fine work of art and will doubtless be on view at the forthcoming Academy Exhibition.

RAILWAY MAGAZINE readers will join us in congratulating Mr. Aslett on this recognition of his organising genius, but we understand there is a movement on foot for still another presentation to him in connection with other valuable services he has rendered the community.

Railway Re-organisation.

FROM Newcastle-on-Tyne Mr. John S. McLean writes:—The proposal of "Basil Mercer" in the January RAILWAY MAGAZINE that the Great Northern and North Eastern railways should amalgamate seems a natural step in the development of these partners if the "East Coast" through traffic is not to suffer.

It is an interesting coincidence that in the same month Mr. C. J. Allen should

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MR. ALFRED ASLETT, J.P.,

Formerly Secretary and General Manager, Furness Railway.

From a portrait painted by Mr. Arthur T. Nowell and presented to Mr. Aslett, by the Anglo-American Oil Company, Ltd.

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notice the frequent loss of time not only between York and Newcastle but on the Great Northern as well. A good deal of this delay is caused through the overcrowding of the lines and want of 'doubling' where only one set of rails now exists, and unhappily this state of affairs is the rule rather than the exception throughout the main line of the North Eastern Railway. 'Widening' between Northallerton and Darlington has been proceeding *for many years*, in a very half-hearted sort of way. It is not so much the locomotive department that is to blame as the inadequate station accommodation and running lines. Even the new Northallerton station has only the two sets of through lines so that trains at the platforms block the way for the expresses passing through the station.

When relief lines are provided they are only for short distances sometimes on one side and sometimes on the other side of the main lines, and as long as the North Eastern Railway remains a principal line this seems likely to continue.

The worst piece of track of all is the stretch from Ferryhill to Durham and Ouston Junction, where doubling begins for a few miles. First there is the subsidence of the track at Croxdale and the immediate ascent to Reilly Mill Junction (the summit of the North Eastern Railway main line), a centre for much mineral and local passenger traffic, followed by the long Durham viaduct, never intended for main line trains and always taken at a crawl and finishing with a second subsidence at Ouston Junction! All this is what the locomotives have to contend with so that it is no wonder that the 36 miles from Newcastle to Darlington occupy more time to run than the 44 miles between Darlington and York.

Durham viaduct cannot be widened, it will have to be rebuilt, but probably the simplest plan would be to construct a new loop line, avoiding Durham entirely, from Shincliffe, on the old main line, across to Newton Hall curve on the present line or perhaps joining further north at Ouston Junction where the double lines begin.

Measured on the ordnance map it is only four miles from Shincliffe to Newton Hall cabin and the continuity of the main line is preserved. This scheme would seem a comparatively simple means of overcoming many of the difficulties encountered on the present route and would furnish a shorter and more direct express route to Newcastle and the North.

A saving of eight minutes for 'down' trains and ten minutes for south-bound trains would probably be effected giving a much better competitive service to Edinburgh. Any way the Newcastle traffic alone is worth it, and the town ought to be much better off than a journey time of never less than 5 hr. 20 min. for the 268 miles, even in pre-war days.

The morning Leeds express could again leave at 9 (instead of 8.55) and still be into Waverley Station same time as before, and the "Flying Scotsman" would arrive at 6 o'clock in the Scottish capital and run at no higher speed than in pre-war days!

Finally, if the amalgamation should merely result in the rebuilding of gloomy King's Cross Station then something will have been achieved; and no doubt with Sir George Gibb once more at his old post we shall witness some interesting developments.

Conveyance of Passengers by the Liverpool and Manchester Railroad.

AN Irish reader, "G.F.O.," has culled the following paragraph from the *Southern Reporter and Cork Commercial Courier*, September 25, 1830, and forwarded it to the RAILWAY MAGAZINE as an item of interest for others. The same newspaper, he states, has reference to the funeral of Mr. Huskisson who, as all are aware, was one of the earliest railway casualties":—

"On Thursday a party, consisting of about 140 persons, started from Liverpool at a quarter before eight o'clock in the morning and arrived in Manchester by half-past nine. They were principally members of the Society of Friends, who came for the purpose of attending the quarterly meeting of their body in this town.

"Yesterday an engine and train of carriages were three times despatched to Liverpool, carrying 241 passengers, and about the like number arrived in this town, by trains which left at corresponding periods of the day. The six trips were severally performed, on the average, in about one hour and forty minutes."

New Use for an Old Yorkshire Line.

A SOMEWHAT unusual but nevertheless very praiseworthy gift is reported from Yorkshire. Mrs. Sonailes, of Whitby and Goathland, has offered to the Whitby Rural Council the old disused railway line, extending from the Goathland Hotel to the Gate House crossing, a distance of 1¼ miles, to be dedicated and used as a public highway. Her husband (Capt. R. Sonailes) and another gentleman have each promised £500 to be applied to the making up of the road. The generous donors were heartily thanked and a special committee appointed to inspect the road with a view to the carrying out of necessary work.

The line referred to is a portion of the Whitby and Pickering Railway which was

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opened in 1836 and worked by horse-power. Steam traction was introduced later, and eventually the company was taken over by the North Eastern Railway. To avoid the drawback and danger of a very steep incline between Goathland and Beck Hole (1 in 11) a deviation was made and the new line was opened in July, 1865. The Gate House is near the point of divergence from the present-day line, and the old route is now portioned out as follows. Gate House to Goathland Hotel—proposed new road; Goathland Hotel to Beck Hole—green track with footpath along it; Beck Hole to Deviation Junction Cabin—re-opened as a single line with summer service only.

Institution of Locomotive Engineers.

At a meeting of the above Institution Mr. T. Thompson gave a lecture on locomotive building practice and instanced the procedure adopted at the extensive and well-equipped North Eastern Railway Works, Darlington.

Starting with the preparation of special tools, jigs and templates which are put in hand immediately designs are received with the orders of the Chief Mechanical Engineer, then prepared and made ready for use while the material on order is beng supplied, he proceeded to detail the various parts of locomotives, dealing with each of the special departments. The boiler was first dealt with as being the most important factor, for all things are subordinate to it in the design of the engine. The processes required for the different plates, drilling, riveting and the special machining were all dealt with, and views of the different appliances necessary to complete the various processes were given. All rivet holes are not only drilled to template, they are reamered out to the exact sizes, so that each particular rivet is dead true in the special parts so manipulated. Stays, expansion brackets, firebox details and each portion from the process of assembly to the finished boiler were carefully considered. It was shown that the method of making the blocks and dies for completing the flanging as far as possible was a subject in which great care had been necessary to achieve the highly satisfactory results obtained. Instances were given of the presses used and the various kinds of stamps and bending work. It was noted that the copper back plates are still chiefly flanged by hand. After flanging the various positions are marked off for machining. The clamping, bedding and other manipulation necessary were shown, together with the jigs and tools used in the series of operations.

The methods of ensuring tight-fitting stays was noteworthy, every stay being provided as required in semi-automatic lathes, which are located in the vicinity for the purpose. They are not made in large numbers, every stay being produced and made for a particular firebox and used as soon as made. This is done to provide for variation through wear and slight differences in manipulation It is claimed that this prevents any risk of there being other than an exact fit, every stay being screwed by hand.

The tubes are given special attention, three roller Thompson expanders and five roller expanders driven by portable pneumatic machines being used. The system of testing each boiler was detailed.

The work in the forge and smithy with one three-ton, two two-ton and other steam hammers, with batteries of electrically driven drop hammers, &c., hot saws and steam strikers and rivet-making machines was described, the latter machines being belt-driven and water-cushioned. A description of the process adopted in the Spring Shop and the various details, with all the important features of work in the "black" departments, brought the first half of the Paper to a close

The lecture was amply and fully illustrated with over fifty lantern slides of the various hydraulic, pneumatic, electric and mechanical machinery in the various departments, and it speaks well for the broad-minded policy of the North Eastern Railway that full permission to make public particulars of these important devices was willingly given.

Brighton Locomotive History.

THE Chairman of the Stephenson Locomotive Society, Mr. John Nevil Maskelyne, Junr., communicates as follows:—

I am following, with very great pleasure and interest, Mr. Ahrons's splendid articles on "Train Working in the latter part of the 19th Century," especially those now dealing with the London Brighton and South Coast Railway.

In his notes on Mr. Stroudley's "Stephenson," or G class singles, however, Mr. Ahrons states that No. 329, "Stephenson" was "the last survivor and lasted until 1912." I trust he will pardon my saying that this is only a half truth. "Stephenson" certainly was the last survivor, but she lasted until 1914. During the summer of 1912, this famous little engine ran the 90-minute "Pullman" express (10.45 a.m. ex Victoria) to Eastbourne nearly every Sunday, returning on the corresponding up train, 5.15 p.m., ex Eastbourne. She continued this duty in the summer of 1913 and the last time I ever saw her at work was one evening late in the autumn of 1913, when she passed

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through Edenbridge station on the 6.30 p.m slow train from Victoria to Tunbridge Wells.

The very last I ever saw of her was on May 23, 1914, when I visited Battersea Sheds and found her "resting" in the round-house. She was then waiting to be broken up, which fate overtook her in June, 1914. It will always seem, to me, a pity that she could not have been preserved. I always took a keen interest in her and consider it worth while to put on record the following interesting points concerning her :—

During her last years, her driver, Every, was the son of Driver Every who had charge of her when she was a new engine in 1881, and drove her in the Wylam "procession" of that year.

When "Stephenson" was scrapped she was exactly thirty-three years old, and retained her original boiler, albeit that the working pressure had been reduced to about 130 lb. per sq. in. This, however, did not prevent her keeping wonderfully punctual time with the Eastbourne "Pullman" express in 1912 and 1913. In fact she frequently managed to arrive, both at Eastbourne and Victoria, with two or three minutes to spare.

Trusting that these few remarks may be of interest to Mr. Ahrons and to readers of the RAILWAY MAGAZINE.

Big Cars.

JUST a year ago, I believe (writes H.L.L.) I started a discussion on "big cars" in the RAILWAY MAGAZINE as an important feature of post-war reform. Since then a great deal as happened, for one thing the war is over. Everything tends to confirm the predictions I then made. When the case for the adoption of the big car is stated so convincingly by experts such as Sir J. A. F. Aspinall and Mr. Kelway-Bamber, further arguments as to its advantages would appear to be unnecessary. A beginning should be made soon, but the full development of this reform will take time, and must wait on the probable future enlargement of the loading gauge. It is no answer to its advocates to say that the big car is unsuited to the existing British system. That is, unfortunately, quite true. What must be altered is the antiquated and unprogressive British system. We require, as your correspondent "C.S.S." of Tennessee says a freight revolution. As he is evidently familiar with both British and American practice, may I suggest, if this should catch his eye, that an article from his pen describing freight train operation in the United States, with a few photographs, would be of considerable interest to your readers and might render good service to the cause of the reforms he supports. In particular, as this appears to be the real difficulty in the way, information as to the methods of handling small consignments or "L.C.L. (*i.e.*, less than car-load) freight" so as to obtain full loads, and as to what has been called the "sailing day plan" or concentration of consignments to and from small places on certain days would be very welcome. In future there must be more co-operation and less individualism on our railways.

Agricultural Light Railways.

May I, inquires the same correspondent, turn to another branch of reconstruction, the proposed scheme of agricultural light railways which Mr. Basil Mercer has so ably advocated? It will not have escaped your notice that these "Agrails" so-called have been made the butt of a regular Press campaign. Certain motoring writers in the weekly press (*e.g.*, *The Observer*) have attacked them almost vindictively; they have been described as a "nightmare web," and Mr. Joynson-Hicks has alluded to the scheme as the "maddest of the many mad schemes of reconstruction." Again the R.A.C. will have nothing to do with the Ministry of Transport, because Sir Eric Geddes is a railway man, and cannot therefore be trusted with the roads. I am convinced that there is more behind this attack than is at first sight visible, and than it has been organised by the powerful interests of the motor lorry manufacturers with the assistance probably of the petrol and oil magnates. These people were looking not only to monopolise all the future great increase of traffic on the roads, but to divert a good deal from the railways, and "Agrails" will not suit them at all. Anyone who has read "The New Moon." Mr. Oliver Onion's "romance of reconstruction" will remember that the author forecasts a time, a few years hence, when the roads will have become so overcrowded with Government land transport and other heavy motor traffic that ordinary travellers, cyclists, carriage-folk and motorists will have all they can do to get through the procession. From this sort of thing "Agrails" may help to deliver us, and should therefore be encouraged.

The "Reconstruction" Time-Tables.

SOME welcome additions were made to the train services of various companies on February 1 last. As yet there is little sign of acceleration, other than that afforded by running again as distinct trains expresses which had as a war time measure been

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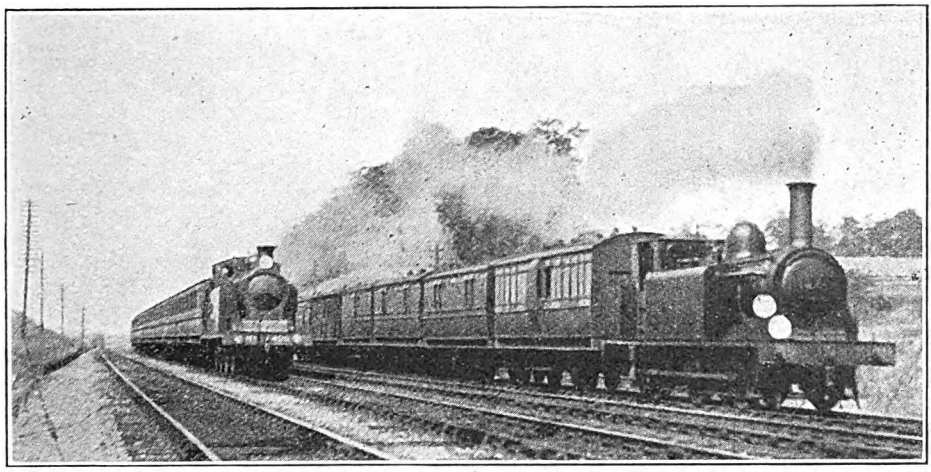
amalgamated, but the comfort of travel has been much improved by the general reappearance of corridor stock and, on several lines, of restaurant cars also. On the Great Northern Railway the principal additions to the main line time-tables are the 7.30 a.m. (previously 7.15 a.m.) express from King's Cross to Leeds, and the 2.55 p.m. from Leeds to London. The former has the fastest booking in operation between London and Peterborough—96 min.—and is timed smartly from there (by present standards) with bookings of 39 min. to Grantham, 40 min. thence to Retford, and 22 min. on to Doncaster. Leeds is reached at 11.53 a.m. But the 2.55 p.m. up, with the same stops, has a slower timing, not being due till 7.35 p.m. The almost invariable division of the 1.30 p.m. down and 5.30 p.m. from Leeds to London; the 1.40 p.m. from London to Newcastle and the 3.0 p.m. from Newcastle to London. It is understood that dining cars will be restored to the Anglo-Scottish expresses early in March, but meanwhile it is curious that the 3.0 p.m. from Newcastle should be chosen in preference to the popular 10.5 a.m. (due King's Cross 5.0 p.m.) as the former arrangement means that the 6.29 p.m. from Doncaster to King's Cross (5.30 p.m. *ex*-Leeds) must be run in duplicate, each portion with restaurant car facilities. This duplication is not at present shown in the time-tables, but the Newcastle portion is nightly run in advance, due in King's Cross at 9.50 p.m., and calling at Grantham only—an exact reversal of the old order, in which the Leeds train called



Photo] [*K.A.C.R. Nunn.*

LONDON, BRIGHTON & SOUTH COAST RAILWAY.

Scene near Purley.

Leeds and Newcastle express becomes permanent, the Newcastle portion leaving at 1.40 p.m., and calling at Grantham (4.4—4.9 p.m.) instead of Peterborough. It is a little surprising that the Leeds portion has not been somewhat expedited to and from Peterborough; as it is likely to delay the Newcastle train through that town or immediately beyond, while the present schedule is preserved. From February 3 dining cars reappeared on the popular 5.30 p.m. express from King's Cross to Newcastle, with the complementary up train at 7.50 a.m. *ex*-Newcastle (due 2.15 p.m.), while from the 10th of last month these facilities were extended to the 7.30 a.m., 10.10 a.m., 1.30 p.m. and 5.40 p.m. from London to Leeds; the 9.20 a.m., 11 15 a.m., 2.55 p.m; at Grantham only, after Doncaster, and the North express at Grantham and Peterborough. The provision of restaurant cars on a "semi-fast" (11.15 a.m. *ex*-Leeds) is a novelty as regards the Great Northern Railway. In the suburban district numerous additions to and improvements of the train service are made, including the reinstatement of a number of fast trains between Finsbury Park and East Finchley on the High Barnet service.

A further list of additions to the Great Eastern time-tables appeared in February, special attention being paid to Clacton-on-Sea, from which resort the 7.0. a.m express to Liverpool Street (due 8.52 a.m.) is reinstated, with the 6.39 p.m. from Liverpool Street to Clacton on week-days, and the 12.30

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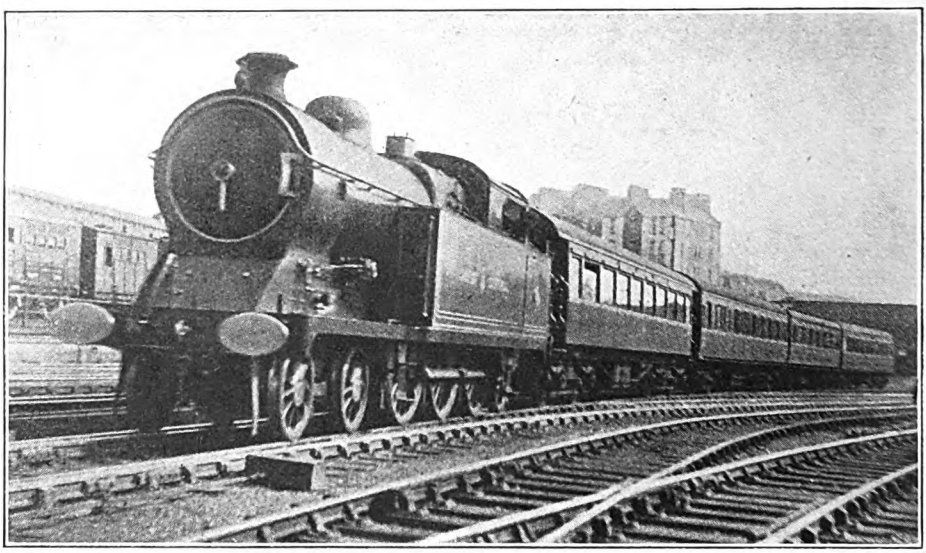
p.m. on Saturdays. The latter is an excellent train, running non-stop to Colchester in 66 min., and reaching Clacton at 2.16 p.m., but for the present the Yarmouth and Norwich sections have not been reintroduced. An extra stop is made by the 7.16 a.m. from Lynn to London (due 10.23 a.m.) at Bishops Stortford, but no extra time is allowed in running. On the Southend service the 4.48 p.m. down now calls at Rochford, an end being thereby made of its impossible timing of 9 min. from Rayleigh to Prittlewell, while the 6.26 p.m. ceases to call at Brentwood, and reverts to its 7.31 p.m. arrival. Other alterations include the provision of a mid-day train in each direction on the Southminster branch, bridging over the previous 5-hour interval, and several



Photo] [*K.A.C.R. Nunn.*

GREAT CENTRAL RAILWAY.

Marylebone-Beaconsfield Train leaving London. Superheated Tank 4–6–2 Engine, No. 24.

further late evening trains in the London suburban district.

Important alterations have been made in the London and North Western main line service from February 1. A new express leaves Euston at 11 a.m., running thence non-stop to Crewe in 3½ hours, and reaching Manchester at 3.30 p.m. and Liverpool at 3.45 p.m. As a complementary up service the 4.10 p.m. up from Manchester is now run independently of the up "Scotsman," leaving Crewe at 5.5 p.m., and reaching Euston, without intermediate stoppage, at 8.40 p.m.; a new through connection from Liverpool at 3.55 p.m. is attached at Crewe. The 2.10 p.m. from Euston to Manchester and Liverpool leaves at 2.25 p.m., but reaches Crewe at 5.55 p.m. as heretofore, with a stop of 8 min. at Rugby. No Birmingham portion is now carried by the 3.50 p.m. *ex* Euston, as there is now a Birmingham and Wolverhampton express at 4.30 p.m., calling first at Coventry and reaching Birmingham at 7.0 p.m., and Wolverhampton at 7.45 p.m. In the reverse direction the 7.30 p.m. from Birmingham to London calls at Bletchley instead of Willesden, between Rugby and Euston, but continues to arrive at 10.20 a.m. The 8.30 a.m. from Manchester to Stoke recommences to run through to London, calling at Lichfield and Nuneaton only, and arriving at 1.5 p.m.; this arrangement enables the Nuneaton stop to be withdrawn from the schedule of the 7.50 a.m. *ex*-Liverpool, and that train, omitting also to call at Willesden, is due in Euston at 12.40 p.m.—15 min. earlier. A fast portion is now run from Preston at 11.20 a.m. of the 8.0 a.m. from Carlisle, with through coaches from the Furness line; this calls only at Crewe, Rugby, Bletchley and Willesden, and is due at 4.15 p.m.—an acceleration of 85 min. Next in order comes the division of the heavy 2.55 p.m. from Rugby to Euston, the Manchester portion (12.5 p.m *ex* London Road) reverting to its non-stop run from Stoke to Willesden, and arriving at Euston at 4.35 p.m., while the Birmingham portion is due at 4.45 p.m. as heretofore. It

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will be noticed that the effect of these changes is to give something in the nature of a standard time, by the best trains, of 4½ hours between London and Manchester, and 4¾ hours between London and Liverpool. Restaurant cars have not yet reappeared on the London and North Western Railway, but teas are now served at popular prices on the principal afternoon expresses.

Numbers of reinstatements of business and residential express trains are made in the Lancashire and Yorkshire services, including the 7.0 a.m. from Manchester to York; the 11 a.m. from Leeds and Bradford to Liverpool; the 10.25 a.m. and 5.10 p.m. Manchester to Blackpool (the last-named non-stop to Lytham); the 8.10 a.m. (non-stop from Lytham) and the 5.20 p.m. from Blackpool to Manchester; the 12.45 p.m. (Saturday only), 5.0 p.m. and 5.40 p.m. Manchester to Southport (the two last-mentioned replacing the war-time 5.20 p.m.); the 8.22 a.m. Southport to Manchester, and others of lesser importance. Principal among the Cheshire Lines Committee's alterations is the reintroduction of the 9.30 a.m. 50-min. express from Liverpool to Manchester, and the 11.30 a.m. from Manchester to Liverpool. Great Central alterations and additions are confined mainly to the Manchester suburban services.

In Scotland we notice considerable improvements to the Glasgow-Edinburgh express services by both routes, the Caledonian Company having now fast trains from Glasgow at 8.40 and 11.0 a.m., 1.30, 4.0 and 5.5 p.m., and from Edinburgh at 8.50 and 11.0 a.m., 1.30, 3.45, 5.0 and 7.5 p.m., most of which call at Holytown and run in a 70-min. schedule, although the 1.30 p.m. trains in each direction are 65-min. non-stop expresses. Over the North British route expresses run from Glasgow at 7.40, 8.40 and 10.5 a.m., 1.0, 2.5., 4.0., 5.0, 8.0 and 9.0 p.m., and from Edinburgh at 7.33, 9.5 and 10.5 a.m., 1.5, 2.5, 4.0 and 5.5 p.m. Six of these trains call only at Haymarket, and make the journey in 65 min., while the 9.0 p.m. *ex* Queen Street is non-stop in 63 min. Various additions are also made to the residential services round Edinburgh and Glasgow. On the North British Railway a restaurant car is now run on the 8.15 a.m. from Edinburgh to Aberdeen, returning as far as Edinburgh on the 6.5 p.m. sleeping car express for the south.

Field-Marshal Haig praises South-Eastern & Chatham Railway.

On more than one occasion reference has been made in The Railway Magazine to the excellent traffic working that prevailed on the South-Eastern & Chatham system during the war. The record is indeed a highly creditable one and we are pleased to notice it has not escaped the observation of the highest military authorities. In a letter to the Chairman, Mr. Cosmo Bonsor, Field-Marshal Sir Douglas Haig remarks:—

"The Army in France owes much to all connected with the control of our railway companies in the United Kingdom, and indeed in the Empire. They have at all times shown the greatest willingness to help us in every possible way in their power. Track has been torn up to give us rails; engines, trucks, men, capable engineers, operations staff, &c., all have been sent abroad to us, regardless of their own special needs and the demands of the people at home, and without a moment's hesitation.

But we have been more closely associated with the South-Eastern & Chatham Railway than any other. The bulk of our ammunition and stores required for the maintenance of our Armies, as well as several millions of men as reinforcements and on leave, have passed over their system. Their sphere of duty, too, has been nearest to the shores of France and Belgium, and consequently more open to hostile attacks by air and fears of invasion by sea. Undisturbed by any alarms the traffic for the Armies in France has never ceased to flow. This reflects the greatest credit on all concerned with the company."

Some idea of the gigantic task that has been o ably handled by the officers and staff of the South-Eastern & Chatham Managing Committee may be gathered from the following particulars of some of the war services rendered by them between August 5, 1914, and December 31, 1918:—

Special trains run (exclusive of empty trains)		101,872
Members of H.M. Forces travelling on Warrant:—		
(*a*) Conveyed to and from ports including leave men	12,141,933	
(*b*) Travelling to and from S.E. & C.R. stations other than ports	13,962,727	
Total		26,104,660
Vehicles, motors, &c., carried ..		43,435
Tonnage of mails, &c., carried ..		324,596
Amount of French, &c., money changed at Victoria Station by overseas soldiers on leave ..		£10,522,480
Hospital ships berthed at the Port of Dover		3,166
Ambulance trains conveying wounded men from the Marine Station, Dover		7,515

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Wounded men conveyed in ambulance trains from Marine Station, Dover	1,215,886
Wagons dealt with in the Woolwich munitions area .. upwards of	3,500,000
Tonnage in Woolwich munitions area .. .. upwar ds of	20,000,000
Tonnage in war material dealt with at Richborough .. upwards of	2,000,000
Trucks conveying guns, locomotives, &c., passing through Richborough to and from ferry	19,818
Tanks passing through Richborough	734
Goods trains worked in and out of Cannon Street Station	5,803
Goods Wagons dealt with at Cannon Street Station	175,000
Value of stores purchased, inspected and despatched by the Managing Committee on behalf of the War Office to the Armies in France, Egypt, Mesopotamia, Salonika and Russia	£1,791,838
Passengers conveyed by the Managing Committee's Steamers between English, French and Belgian ports	6,146,097
Passengers through the Ports of Dover and Folkestone	12,722,157
Lives saved by Managing Committee's Steamers	3,203
Tonnage of coal supplied to troop and ambulance transports by the shore staffs at Folkestone and Dover	402,968

London, Brighton & South Coast Railway and the War.

In common with other railways, the London, Brighton and South Coast Railway was called upon to do important service in connection with the war.

The immediate selection of Newhaven, and some months later of Littlehampton (at one time used for the company's Continental services), as ports of embarkation for munitions and war stores, brought a concentrated and continuous traffic over the railway from all parts of the country.

All kinds of munitions, military stores and foodstuffs, coming for the most part from the places of production, were carried over the railway as goods traffic, and up to the present the quantity conveyed to these two ports amounts to 6,805,810 tons, while a substantial tonnage passed over the line to other places on the railway.

The number of special trains which were run in connection with this traffic was 53,376. The largest number of loaded special trains dealt with in any one day was 64. The number of loaded wagons handled at Newhaven and Littlehampton was close on 1,000,000. A considerable quantity of war traffic was, of course, also conveyed by the ordinary goods trains.

Goods consigned to the ports were transhipped from the railway wagons to the ship by male and female labourers, engaged specially for the purpose, the male labourers working in three shifts of eight hours in each 24-hour period, and the work proceeded without cessation all day and night on week-days and Sundays; the women, however, worked only in day shifts.

The number of transports entered at the ports was 9,061 at Newhaven and 2,098 at Littlehampton. The ships were drawn from various sources. During the course of the work at Newhaven as many as 37 transports have been in the port at one time, as well as a number of tugs, destroyers and other vessels, and the quay space has accommodated 14 ships alongside at once. This rendered it possible to tranship goods and material up to 10,000 tons per day.

In comparison with the total number of voyages across the Channel, in spite of the great risk, the casualty list is light, as only five ships were lost.

To cope with this enormous traffic, considerable mileage of additional siding accommodation had to be provided, not only at Newhaven and Littlehampton, but elsewhere on the company's system, as shunting and standing places. Extensive warehouses and other buildings, as well as cranes, electric power and other appliances were also provided at the ports and other places.

The wages bill for the casual labour alone, at the ports, up to the end of 1918, amounted to £1,127,648. At Newhaven free meals were obtainable, and as the large majority of the workers came from Brighton and neighbourhood, free transit was provided for them to and from their homes.

Passenger train traffic, although it did not equal the goods traffic in volume, was considerable and comprised the conveyance of troops to and from the many camps on the system or to join the Armies abroad. A large number of horses, guns and stores were also conveyed. A substantial part of this business was dealt with by the ordinary passenger train services, but 27,366 special passenger trains were employed in addition. This makes an aggregate number of 80,742 special passenger and goods trains used for the purpose of the war, and if the running had been constant there would have been a train for every half-hour from the day war broke out until the day the armistice was signed.

There were also ambulance trains comng from other railways to various hospital depots on the company's system, more particularly Brighton, where a large number of wounded men were treated in the Royal Pavilion and elsewhere in the town, and the company's staff, some of whom are highly trained first-aid experts, contributed very materially to the safe and comfortable

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transfer of the wounded men from the rail to the road vehicles at the various stations. Two ambulance trains were built at the company's works at Lancing for use in France, one of which is known as "Queen Mary's" train, and other war work at Lancing included the construction of a number of general service wagons for use at the front, and a quantity of ambulance stretchers. A considerable amount of munitions work was done in the locomotive shops at Brighton, comprising the manufacture of hand grenades, shell parts and other items of similar character.

The fleet of passenger and cargo ships owned jointly by the Brighton and French State Railway administration was requisitioned at the outbreak of war, some by the English and some by the French Government.

Both the s.s. *Arundel* and the s.s. *Brighton* were fitted out as troop ships, and in the course of 969 voyages across the Channel the *Arundel* carried 657,860 officers and men. The *Brighton* was afterwards converted into a hospital and ambulance ship, and in that service has made 973 voyages and conveyed 122,636 sick and wounded men. The *Brighton* also conveyed his Majesty in 1914 from Newhaven to Dieppe, and recently the President of the U.S.A. and Mrs. Wilson both ways between Dover and Calais on the occasion of their visit to this country.

Engaged in the first place as a transport from Newhaven to Rouen, Havre, Boulogne, Calais, Dunkirk, Ostend, Zeebrugge and Bruges, in which service she carried stores, ammunition and occasionally troops, the *Dieppe* was afterwards fitted out as a hospital ship, and subsequently converted into a troopship, and in that capacity conveyed 459,636 troops across the Channel.

The *France* became a troop ship, working from Southampton, Dover and Folkestone, and in the course of this service conveyed 207,319 troops.

The *Newhaven* was employed by the French Admiralty during the early part of the war, and was transferred to the English Admiralty, by whom she was fitted out as a hospital ship, in which service she was engaged until last autumn, when she was converted into a troop ship. In these capacities she has made 1,066 voyages.

Mobilised as an auxiliary scout, in which capacity she assisted French submarines, the *Rouen* had engagements with enemy submarines in the Channel, including one of 25 minutes' duration, at the end of which the submarine was presumed to be sunk or badly damaged. In December, 1916, she was torpedoed on returning from an expedition against an enemy submarine in the Bay of St. Malo, and not only was she badly damaged, but five of her company were killed and several severely wounded. She drifted towards Dieppe, but was taken in tow to Cherbourg, where she was repaired, and afterwards employed for some time on the transport of troops between Corfu and Taranto and Itea. On one ocasion in the course of her service, she was in the Adriatic Sea in the company of the French cruiser *Chateau Renault*, and was only a short distance away when that ship was torpedoed and sunk.

The *Sussex* was first employed as a troop ship between Dieppe and Havre, and afterwards in the Folkestone passenger service. She was torpedoed when crossing the Channel in March, 1916, but was not a total loss, and after repair was requisitioned by the French Marine at Havre.

The *Paris*, the last addition to the Newhaven and Dieppe passenger fleet, was taken over by the British Admiralty as a commissioned ship in His Majesty's Navy for the special service of mine laying in the North Sea, more particularly off the Flanders coast and Emden, and her record is most interesting. Considerable internal alterations were made. Four guns were mounted on her upper deck, and a higher bridge with a range finder was built. The mines were carried on the main deck and a full load weighed nearly 200 tons. Notwithstanding these changes in her trim, and the strain of fast steaming in heavy seas, carrying weights in a manner for which she was not constructed, she has in no way suffered structurally. Her engines are as perfect as ever, and on one occasion maintained a speed of 24 knots per hour for six or seven hours.

Belonging to the company were six cargo boats, viz., *Cherbourg*, *Portsmouth*, *Brest*, *Maine*, *Anjou* and *Bordeaux*, and these were requisitioned for various war purposes, including mine sweeping, patrol and transport work, in the course of which the *Cherbourg* struck a mine and was so badly damaged that she had to be broken up, whilst the *Maine* and *Anjou* were totally lost by torpedo and mine with regrettable loss of life.

Those ships which ran between Dover, Folkestone, Boulogne and Calais were especially exposed to attacks from the air, particularly in the spring and summer of last year, and some of them had narrow escapes. For example, the *Newhaven* had 34 bombs dropped near to her at one time or another, some from planes flying in relays covering a period of six hours, and the *Dieppe* on one occasion in a Belgian port, and on another at Calais, had bombs dropped within a few

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feet of her, the latter occurrence causing damage to some of her gear.

The total number of the Brighton Railway staff who left to join H.M. Forces numbered 5,265, being 32.3 per cent. of those in the company's service at August 4, 1914. There are upon the Roll of Honour up to the present the names of 473 who have fallen, and notice has been given of 882 who are. either wounded or missing or have been made prisoners. There are 79 names on the Decoration Roll. The distinctions include the Distinguished Service Order, the Military Cross, Distinguished Conduct Medal, Military Medals, Distinguished Conduct and Distinguished Service Medals, Meritorious Service Medals, five foreign decorations, and a medal of the Order of the British Empire.

It is the company's intention to erect at Victoria a handsome memorial to the men who so nobly gave their lives to their country, and to place replicas at other principal stations on the Company's system.

High-Speed Railways.

Mr. E. W. Chalmers-Kearney, interviewed by a contemporary on the subject of high-speed railways, said that in the case of the Kearney high-speed tube system the stations will be on or just below the street surface, doing away entirely with long stairs, escalators and lifts. "Between the stations the connecting tubes descend by means of gradients of 1 in 7 to a depth of about 100 ft. below the street," he said, "Not only does this gradient system abolish lifts but it doubles the speed of the trains, besides effecting enormous saving of power and wear and tear, as gravity does three-quarters of the work of starting and stopping the trains. My system is at last to be put to a practical commercial test in London. Plans have been deposited with the Board of Trade for a high-speed tube railway from North Woolwich Station to the gates of Woolwich Arsenal. Dipping under the Thames by means of a gradient of 1 in 7, which will take the tube to a depth of 110 ft. below street-level and over 40 ft. below the bed of the river, the line rises again on the south side by a similar gradient to a station immediately beneath the street level right to the Arsenal gates in Beresford Square. The journey of three-quarters of a mile will be accomplished in one minute. Awaiting official sanction are plans for lines from Australia House, Strand, to the Crystal Palace (10 minutes, including four stops), and from the Oval, Kennington, to Victoria and Cricklewood (10 minutes, including six stops). Sixty miles an hour with a comfort that no existing tube railway can offer is something to consider in the very near future."

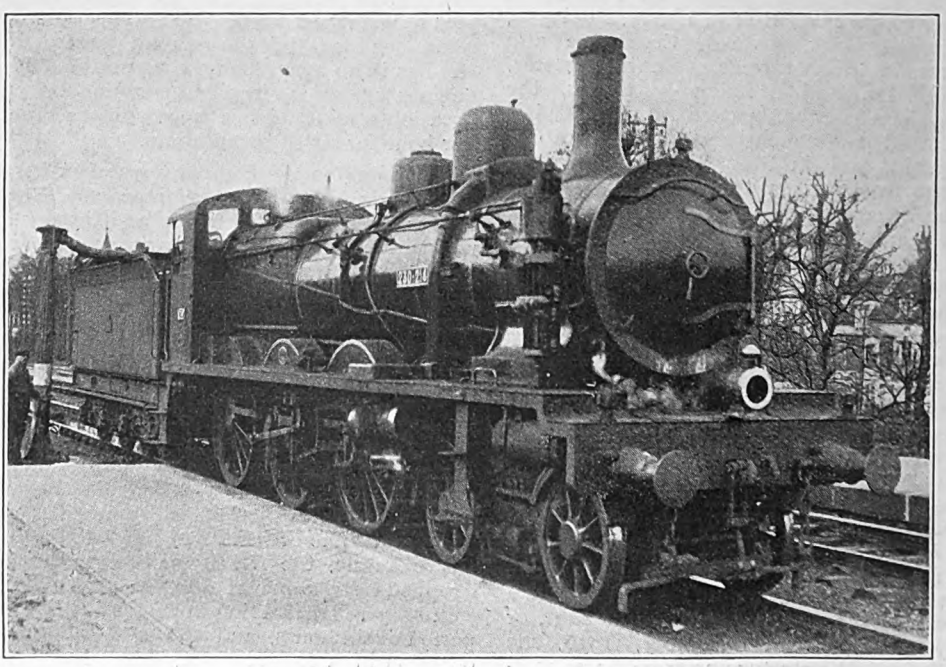

Photo.] **FRENCH STATE (WESTERN) RAILWAYS.** *[W. H. C. Kellad.*

4-6-0 Compound Express Locomotive taking water at Poissy.

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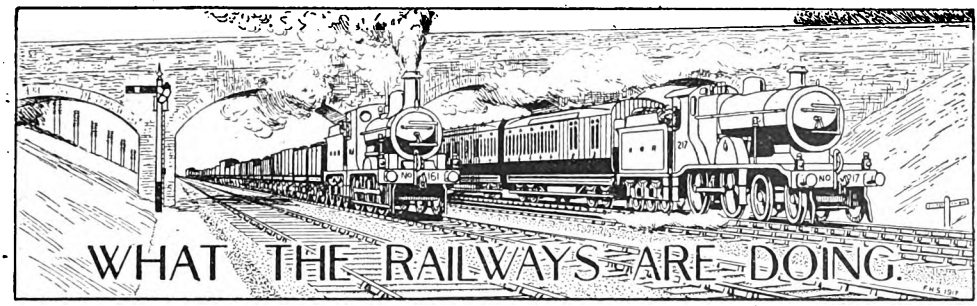

Mr. John C. Christie has been appointed by the directors of the North British Railway to the position of Chief Goods Manager *vice* Mr. John Wilkinson, deceased. Mr. Christie commenced his duty in his new post on February 7. He has had a wide experience in railway affairs, having been a Station Clerk, Relief Stationmaster, &c. For a year or two he severed his connection with the North British Railway to fill a post on the railways in India; but later returned, and was appointed to the goods train working department of the office of the Superintendent of the line. On Mr Walker's promotion to Coatbridge, Mr. Christie became Chief of the Excursion Department, and in that capacity had a large share in the military arrangements in connection with the Royal Review in Edinburgh. On Mr. Cunningham's retirement from District Superintendent in Glasgow, Mr. Christie was chosen to succeed him, and from this post he went to fill the position of Assistant Chief Goods Manager in the early days of 1918.

Mr. JOHN C. CHRISTIE,
Chief Goods Manager,
North British Railway.

* * *

At a recent meeting of the Irish Railway Clearing House Committee the Rt. Hon. Sir William J. Goulding, Bart., D.L., was unanimously re-elected Chairman of the Committee for the year 1919. Sir William J. Goulding was first elected to this position in 1906, and has been re-elected each year since that date.

* * *

Captain G. F. Dixon, who has been for many years Marine Superintendent of the South-Eastern and Chatham Railway fleet of cross-Channel passenger and mail steamers, in the Dover-Calais and Folkestone-Boulogne services, has retired. Captain Dixon was responsible for the introduction of turbine engines in Channel passenger steamers, and the experimental boat, the *Queen*, proved so successful that the system has become almost universal in the passenger steamers of all railway companies' routes.

* * *

Mr. James Walker Davidson who has been appointed Railway Commissioner for Queensland, is one of the most promising young railway experts in Australia. He is a Scotsman, having been born some 47 years ago in Glasgow. After completing his education he served for some time in his father's printing and publishing works, Buchanan Street, Glasgow, and laid the foundation of a business training which has stood him in good stead on many occasions. He went to Queensland as a young man in 1889 or 1890, and obtained an appointment in the office of the then Traffic Manager of the Northern and Western Railway (the late J. F. Thallon), and from that date his career as a railway officer has been a series of successes. He followed Mr. Thallon when that gentleman was appointed General Traffic Manager for the whole State, and filled several positions in the traffic branch, including those of staff clerk and accountant, chief clerk and traffic superintendent. He also acted as Traffic Manager in Brisbane, and ably carried on the work of the General Traffic Manager when Mr. Evans was absent for a long period through illness. Later Mr.

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Davidson was attached to the Commissioner's office, and his work there brought him into special prominence, resulting in his being chosen from a number of highly-promising officers as Chief of the Railway Service.

* * *

RECENTLY the *London Gazette* announced:—"Hon. Lieut.-Colonel (temporary Brigadier-General) H. W. Thornton, Eng. and Rly. Staff Corps, from Dep. Director-General of Movements and Railways at the War Office, to be temporary Major-General whilst so employed; January 20, 1919." Sir Henry W. Thornton, whose name appeared in the recent list of recipients of the K.B.E., was born in Indiana, U.S.A. He entered the American railway service and became General Superintendent of the Long Island Railroad in 1911. He held that post till February, 1914, when he was selected by the directors of the Great Eastern Railway to succeed Mr. W. H. Hyde as General Manager.' Placing his services at the disposal of the Government, he was, in 1917, appointed Deputy Director of Inland Waterways and Docks, and then Assistant Director-General of Movements and Railways, with the temporary rank of colonel, and, last April, Deputy Director-General, with the temporary rank of brigadier-general.

* * *

MR. W. MARRIOTT, who has been appointed by the directors of the Midland and Great Northern Railways Joint Committee to be Engineer and Traffic Manager as from January 1, served his time with Ransomes and Rapier, Ipswich; and having been Contractors' Agent in the construction of the old Eastern and Midlands Railway, was appointed Engineer of that line in 1883 and Locomotive Superintendent in 1884. This undertaking, it may be recalled, was jointly acquired by the Midland and Great Northern Railway Companies in 1893, and Mr. Marriott has since held the position of Locomotive and Way and Works Engineer under the Joint Committee. His new appointment has arisen in consequence of the death, last October, of Mr. John J. Petrie, who was Traffic Manager from July 1, 1898.

* * *

MR. F. D. STONES, whose portrait appears on this page, is a son of the late Mr. Henry Stones, who was Stores Superintendent of the London and North-Western Railway at St. Helen's Junction for a number of years. Mr. F. D. Stones was educated at the Liverpool Institute and entered the service of the London and North-Western in December, 1880, at the General Stores Department, and was transferred a year or so later to the Locomotive Department at Crewe under Mr. F. W. Webb. He served in various capacities in the Stores Department at Crewe, and was appointed Chief Storekeeper there in May, 1892, which position he held till May, 1910, when he was appointed Stores Superintendent at St. Helen's Junction. Whilst at Crewe Mr. Stones served with the 2nd Cheshire Royal Engineers Railway Volunteers for 14 years under Colonel Sir Edward Cotton Jodrell, K.C.B. During that period he was in command of "B" Company for

MR. F. D. STONES,
Appointed Assistant to the General Manager (Buying and Sales Department), L. & N.W.R.

seven years, and for five years acted as Adjutant to the Corps under War Office appointment, retiring in 1906 with the rank of Major. Mr. Stones now holds the position of Assistant to the General Manager (Buying and Sales Department) at Euston, to which position he was appointed on January 1.

* * *

MR. G. J. CHESTERS, who has been appointed Superintendent of the General Stores and Sheeting Department, St. Helen's Junction, London and North-Western Railway, entered the service at Northampton in June, 1878, as Junior Clerk in the Engineer's Office. In 1887 he was transferred to the Locomotive Department at Crewe and served in the Accountant's Office there. In July, 1898, he was appointed Chief Clerk and Accountant in the General Stores Department at St. Helen's Junction

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Two years later, in May, 1910, he was again transferred to Crewe to fill the post of Locomotive Storekeeper, in succession to Mr. Stones, who had been appointed to take charge of the General Stores Department, St. Helen's Junction. When that gentleman succeeded Mr. Stanley Hunt as head of the Buying and Sales Department at Euston, on January 1, 1919, the directors of the London and North-Western Railway appointed Mr. Chesters Superintendent of

Photo. [*Hulton.*

MR. G. J. CHESTERS,

Appointed Superintendent of the General Stores and Sheeting Department, St. Helen's Junction, L. & N.W.R.

the General Stores and Sheeting Department at St. Helen's Junction, where he had been Acting Superintendent since June, 1918.

* * *

By the death of Mr. Francis Brady, a notable figure has been removed from the railway world. He was appointed Engineer of the South-Eastern Railway in March, 1870, having succeeded the late Mr. P. Ashcroft, but Mr. Brady had been in the service of the company for several years prior to that date as one of their Assistant Engineers. He was responsible, amongst many other notable works, for the construction of several new branches of the railway, viz., the Hythe and Sandgate, the Bromley direct, the Westernham, the Hundred of Hoo with the landing stage at Port Victoria, the West Wickham and Hayes and the Bexleyheath Lines. The late Mr. Brady was also responsible, under the direction of the late Sir Edward Watkin, for the experimental boring carried out under the South-Eastern Railway Act, 1874, to a distance of two miles under the sea in connection with a proposed Channel tunnel, which work was stopped by the action of the Board of Trade under the presidency of the late Mr. Joseph Chamberlain, who obtained an injunction for the works to be discontinued in July, 1882. The late Sir Edward Watkin then conceived the idea of boring for coal, and called in the services of Professor Boyd Dawkins, the great geological expert, who advised that there was a great possibility of the existence of coal. This confirmed Mr. Brady's opinion, who was then instructed to commence boring operations which proved the existence of coal, so that he may be considered as one of the pioneers of the discovery of coal in Kent. The death of Mr. Brady, who lived to the age of 90, and retained his faculties to the last, will be deeply felt by a large circle of friends.

* * *

Mr. John B. Rogers, Chief of the General and Rolling-Stock Office of the Department of the Superintendent of Operation at Liverpool Street, Great Eastern Railway, has been appointed to succeed Mr. J. S. FitzJohn as Divisional Superintendent of Operation on the Western Division. Mr. Rogers has been a member of headquarters staff since May, 1888, and prior to 1893, when he undertook mineral rates work, he had gained valuable experience in works and tenancy matters. Upon the formation of the mineral department in July, 1900, Mr. Rogers became principal mineral rates clerk, and in March, 1903, was appointed chief clerk to the mineral manager. In June, 1914, he was placed in charge of the goods manager's general office. Since the opening of the war he has had an essential share in solving many of those home railway problems associated with that period—manipulation of rolling-stock, transportation of traffic, &c., &c.—and has represented his company on several important railway and Government committees.

* * *

During the war, 1,060 Taff Vale railwaymen joined either the Navy or the Army. Of this number 86 have lost their lives. The following distinctions have been earned: Military Cross, 3; Bar to Military Cross, 1; Military Medal, 9; Bar to Military Medal, 1; Distinguished Conduct Medal, 2; 1914 Star, 1.

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THE orchestra of the Great Eastern Musical Society paid a further visit to the Aldwych Theatre (Australian Y.M.C.A.) on February 5, when, in spite of the weather conditions and various transport difficulties, the orchestra turned up almost to a member, thus clearly indicating their enthusiasm in the work of entertaining our soldiers. They were well rewarded with a crowded audience, which completely filled the entire theatre. The vocalists were Miss Elizabeth Hyde, Miss Doris Smerdon and Miss Minna Deacon, all of whom had to give encores to each of their songs. Colonel Galloway, who conducted, at once established the customary cordial feeling throughout the house, and, in response to his suggestion, the choruses, &c., were taken up by the audience in a manner good to listen to. Mr. W. D. Young, who is in charge of the arrangements at this theatre, called for cheers for the Society for the entertainment they had provided, and, at his suggestion, Major-General Sir Henry Worth Thornton, the General Manager of the Great Eastern Railway, who was present in the theatre, addressed a few remarks to the audience. He spoke of the pleasure enjoyed by all concerned with the Musical Society in being able to provide these entertainments, which it was evident were so much appreciated, and humorously mentioned that whatever may be the condition of affairs in other places, it was clear from the attendance of the ladies and gentlemen in the orchestra that evening that they at least had not gone on strike. The Great Eastern Railway Company, he continued, were proud of their Musical Society and the excellent work it had done and was continuing to do for the entertainment of those serving with the Colours.

* * *

THE Association of Superannuated Railway Staff, which was established by resolution of a meeting at Caxton Hall, Westminster, on October 1 last, has already secured so large a measure of support that it confidently calculates upon a membership of 5,000 in the early future. The association has presented the hard case of the superannuitants to the Chancellor of the Exchequer and the President of the Board of Trade, with strongly reasoned arguments as to why the superannuated members should, in justice, be included in the bonus system now applying to all railway workers, and it has approached the Railway Executive Committee, the Railway Clearing House, and the 49 railway companies interested in superannuation, with a request to exercise their influence with the controlling powers in support of the appeal of their veteran staffs. Representations have been made to a large number of members of the House of Commons, with satisfactory results. Local committees of the association are being set up at many important railway centres. When the more urgent bonus question has been settled it is the intention of the association to convene a conference of experts and others interested to examine and report upon railway superannuation generally, in view of the situation created by the grave disturbance in economic values, and the foreshadowed changes in the national status of the railways. Mr. G. B. Bayley, of 19, Elgin Road, Croydon, who has for many years taken an active part in connection with superannuation questions, has been elected chairman of the assocaition.

* * *

AT the fourth meeting of the fourth year of the London Underground Railway Efficiency Meetings, in the L.G.O.C. Training School, Milman's Street, Chelsea, Mr. H. E. Blain, Operating Manager, presided over an attendance of about 300 members of the Control staff. Papers on "A Day in a Traffic Controller's Office" were delivered by (*a*) Mr. A. Earle, Traffic Controller, District Railway; (*b*) Mr. D. Williams, Traffic Controller, Tube Railways, and (*c*) Mr. H. Wood, Traffic Controller, L.G.O.C. The papers described the physical equipment of railway and 'bus traffic control offices, which were also illustrated by slides. The important part played in traffic control by up-to-date methods was discussed and criticised, and a number of valuable suggestions made by the Control Staff in the excellent discussion which followed, and was opened by Mr. J. Moran, Divisional Inspector, of the 'Bus Company, and Mr. R. Smith, Divisional Inspector, Tube Railways, and taken part in by a number of representative officials.

* * *

ON and from Monday, February 3, the services for the conveyance of civilian passengers between London and Paris (subject to passport regulations) have been as follows:—

LONDON TO PARIS.

Victoria (S.E.-C.R.) ..	dep. 9.25 a.m.
Folkestone	,, 12 noon.
Boulogne	,, 2.40 p.m.
Paris	arr. 6.40 ,,

PARIS TO LONDON.

Paris	dep. 9.15 a.m.
Boulogne	,, 3.15 p.m.
Folkestone	,, 5.20 ,,
Victoria (S.E.-C.R.) ..	arr. 7.25 ,,

The arrival in Paris at 6.40 p.m. enables passengers to catch the night trains to the South of France.

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As will be seen by our advertisement pages, a gentleman is wanted to represent an important firm to British railways. Qualifications are good social status and ability to move amongst the higher officials. Applicants should write to a firm of agents in New Bridge Street, London, E.C., mentioned in the advertisement.

* * *

EXTENSIVE use, writes a RAILWAY MAGAZINE correspondent, is being made in Great Britain of electric battery locomotives in factories, goods yards, and other places where a considerable amount of shunting has to be done. The Ministry of Munitions ordered a large number of these machines for expediting the handling of large quantities of materials in Government works. There are many objections to the use of steam locomotives in or near factories. The noise and the emission of steam and smoke are the chief drawbacks. Where explosive or inflammable goods are stored there is also the danger of fire. Further, a steam locomotive is using power even when it is idle, and it involves a lot of time and trouble in connection with coal, water and the disposal of ashes. The electric battery locomotive cuts out all these faults and dangers. Its equipment consists simply of secondary cells, controllers and driving motors. The cells are charged during the idle night hours, so that the locomotive is ready for work in the morning. It runs quietly and can be easily driven by an ordinary workman after a short training. As it can be built with a very short base it can negotiate sharp curves with ease. The designs produced by British engineers have proved so successful that a large development of this mode of point-to-point haulage is expected.

* * *

FOLLOWING an answer in "The Why and the Wherefore" section of the February RAILWAY MAGAZINE, given to "E. J. K.," concerning the "Camel" class engines of the Great Western Railway, Mr. L. B. Hewitt thinks the following additional information will be appreciated by the original questioner and others. He remarks:—The first of this type, No. 3,340, was numbered 3,352 when she first appeared in November, 1899. At that date, her unwonted appearance had quite a revolutionary effect. The type, however, speedily became a standard, and in turn was subjected to the various modifications which have produced the "Cardiff" class of to-day. When first built this engine had an ash ejector fitted at the bottom of the extended smokebox, and this apparatus at first sight suggested an unusual arrangement of the blast-pipe. No. 3,352 had the distinction of bearing four number plates when first turned out. On the cab sides were the combination name-plate and number-plate, still borne by so many of the class, while on the sides of the smoke-box were two of the still standard pattern of Great Western number-plates. She retained these latter adornments for at least a year or two afterwards, but by now they are probably removed. The next engine of the type, No. 3,332, *Avalon*, also carried these extra number-plates, but they were placed lower down, on the saddle supporting the smokebox. They were not fitted on the succeeding engines of the type.

* * *

So many RAILWAY MAGAZINE readers are interested in the working of Great Western Railway 4–6–2 locomotive, No. 111, *The Great Bear*. Mr. J. C. Searls writes to say he has lately seen it working the 12.45 p.m. train from Bath to London, and noted that the engine in question has conformed to the standard Great Western Railway war-time livery, *i.e.*, all green, the safety valve cover and copper-capped chimney being painted over.

* * *

THE first ten of a large order for "Prince of Wales" class engines will shortly be in service on the London and North-Western Railway, Nos. 28, 263, 295, 391, 740, 805, 863, 940, 1,196 and 1,546. They replace shunting engines of the Special Tank class now numbered in the 3,000 list. All the above new engines will be turned out without names. These, it is understood, will be added later. Latest four-cylinder compound mineral engine to be simplified with superheater is No. 1,353. It has piston valves and cylinders 20½ ins. diameter. Two Belgian 0–6–0 engines are undergoing repairs at Crewe.

* * *

IN the Queensland Legislative Council recently a motion was carried to expedite consideration of the proposed Many Peaks–New Cannindah, Yarraman–Nanango and the Haughton River loop lines. The Haughton River loop line is estimated to cost £31,533. The line will commence at Giru siding, half a mile on the Townsville side of the Haughton River, and it will form a complete loop by rejoining the North Coast line at the point of commencement. It is a purely sugar cane line. The estimated working expense is £1,035 a year and the probable revenue £700. It is believed, however, that the building of the line will increase the area under cane. The construction of the line was recommended by the Public Works Commission. The proposed line from Yarraman to Nanango is a continuation of the existing line to Yarra-

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man, and as the country is broken, earthworks will be heavy. The estimated cost of the line is £133,803, and the working expenses are estimated at £5,236. The report states it is understood that a settlement for returned soldiers is being established in scrub land served by this connection.

* * *

ON the opposite page there appears an illustration showing a group of the directors of the Shropshire Union Canal Company on the platform of the London and North-Western Railway Station at Chester on the occasion of a recent tour of inspection of the canal, which latter is the property of the London and North-Western Railway. The special train on this occasion was hauled by the Claughton type locomotive "G. R. Jebb." Mr. Jebb, who is engineer of the Shropshire Union Canal Company and, as such, an officer of the London and North-Western Railway, is seen in the photograph standing near the locomotive with his hands folded before him. The canal is annually inspected by the directors, a special train being provided for the purpose of the tour.

* * *

POSSIBILITIES for the East London Railway as part of a through line for north and south traffic were suggested by Lord Claud Hamilton to the shareholders of that company at the recent annual meeting. At present the East London has a physical connection for through traffic purposes with the South-Eastern and Chatham and the Brighton lines, and by that means reaches either Dover, Folkestone or Newhaven. In a northerly direction, however, the East London virtually ends, so far as through traffic is concerned at Spitalfields, where there is a hoist belonging to the Great Eastern Railway which raises or drops two trucks at a time for the carriage of goods. As regards passengers the only through traffic the East London has is over the Metropolitan and the Metropolitan District. But there is in existence a double line tunnel in good preservation commencing at Spitalfields and running up towards the Great Eastern Cambridge main line. That tunnel was made originally by the East London Railway, and presumably it was owing to lack of funds that its end was not reached. A very small sum and very few engineering difficulties would enable this tunnel to be extended so that it would come out on the Great Eastern Cambridge main line between Cambridge Heath and London Fields. That would mean that through trains from the North of Scotland could run, going through York over the Great Northern and Great Eastern Joint Line through Cambridge right through to the sea coast in the South of England without change of carriage. In view of the importance of developing our through traffic with France it was suggested that the Government should consider the question of providing this link.

* * *

WORK upon the widenings and alterations at Chalk Farm, London and North-Western Railway, is now being recommenced, and it is hoped that an early date will see the completion of the last section from Chalk Farm to Queens Park of the Euston–Watford widening and improvement scheme. At Euston Station additional parcels office accommodation is being provided on the arrival side. At Willesden extension of the goods accommodation is in use. At Dudley, owing to subsidence caused by mining operations, it has been necessary to provide new stables for the horses employed by the railway company. New goods offices at Deighton (near Huddersfield), for dealing with the large traffic from the British Dyestuffs Corporation, Limited (formerly British Dyes, Limited), are complete and in use, and an extension of the goods office at Plodder Lane (near Bolton) is now being carried out. Four new fodder sheds have been erected at Holyhead for Irish cattle traffic. A new goods station at Blackwood, on the Sirhowy Line, was opened for traffic in December last.

* * *

GREAT CENTRAL RAILWAY viaducts at Mottram and Dinting are being strengthened by the erection of additional piers. Land has been purchased and preparations are being made for proceeding with the duplication of the former viaduct.

* * *

IN regard to the Arigna Railway the Midland Great Western Railway of Ireland reports that the extension of the Cavan and Leitrim Light Railway has been proceeded with, but is not yet available for traffic. To obtain full advantage from the connection improved transhipping arrangements at Dromore will be necessary.

* * *

DURING 1918 the following new works have been completed by the Highland Railway: Timber traffic sidings to the order of various Government departments at (a) Dornoch; (b) Sluie, between Forres and Dunphail; (c) Inverlaidnan, north of Carr-Bridge; (d) Orton. A siding and loading bank at Aberfeldy is almost completed. Certain sidings at Kyle of Lochalsh and a train crossing loop at Laon, between Achnashellach and Achnasheen, for Admiralty requirements, have also been completed. The original bridge over the Trium,

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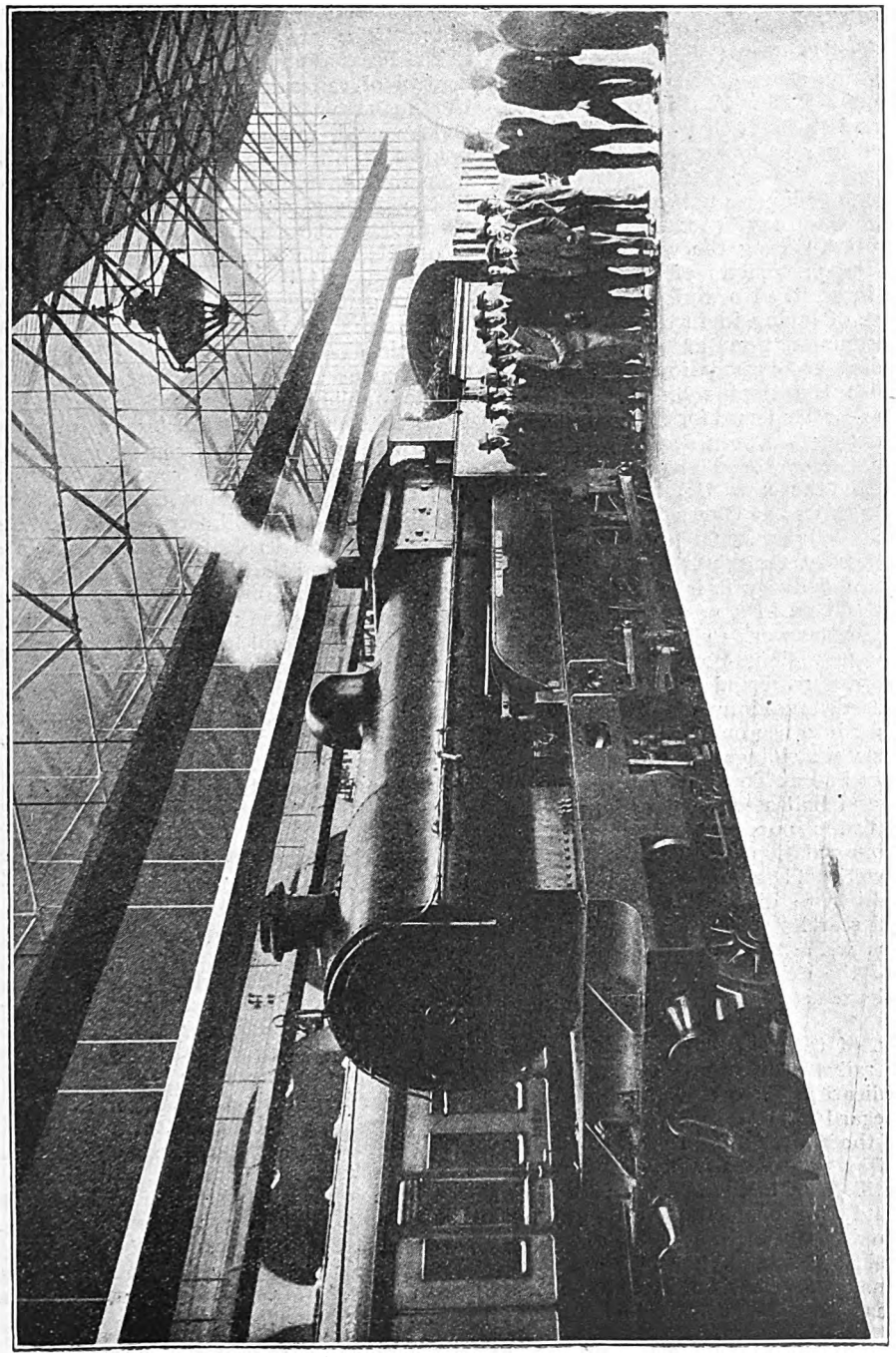

DIRECTORS OF THE SHROPSHIRE UNION CANAL COMPANY, WITH L. & N.W.R. SPECIAL TRAIN AT CHESTER STATION.
(The Canal is the property of the London & North-Western Railway.)

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north of Dalwhinnie, has been replaced, and the viaduct over the Attadale River near that station is in process of reconstruction.

* * *

THE Powell Duffryn Company have commenced to sink a new colliery at the end of the Rhymney Railway's Cil Haul branch at Devi, and the branch is being relaid in preparation for this new source of traffic.

* * *

NEW engineering works on the North British Railway have necessarily received little attention during the war period, but the following particulars of work in hand will be of interest. No work has been done in the way of laying in further permanent siding accommodation at Granton, but certain siding accommodation used in connection with the tipping of materials has during the year been used for traffic purposes. Nothing further has been done towards the erection of the overhead gangways in connection with the new Goods and Parcel Forwarding Offices at Queen Street Station, Glasgow, as delivery could not be obtained of the necessary material. Under altered conditions of delivery it is anticipated the contractor will be in a position to put the remainder of the work in hand at an early date. The new signal-box, facing connection, cross-over road and relative signalling for Donibristle aerodrome were completed and brought into use on November 26 last. Four of the six sidings on the south side of the main line at Townhill Junction have been laid and ballasted and are now being used for traffic purposes. Completion of siding accommodation at Bathgate (Upper) and other works of less importance, have been delayed owing to difficulties in regard to labour and scarcity of material. Works in connection with the extension and rebuilding of the existing entrance at Methil No. 3 Dock are now approaching completion.

* * *

SEVERAL of the annual reports for 1918 issued by railway directorates refer to the lack of indication as to Government intentions in regard to the home railways. In the case of the Metropolitan District Railway the directors state as follows: "Your railway still remains under Government control, and no information can yet be afforded to the proprietors as to how long this control will extend, nor in respect to the Nationalisation of Railways to which reference has been made from time to time by members of the Government." In the case of the Lancashire and Yorkshire Railway a relatively full statement is made in this connection, which may be quoted in full: "The proprietors will have noticed in the Press announcements as to the future control of railways. Those responsible for the management of the railways have endeavoured, in the interests of the shareholders, to obtain some definite information from the Government as to their intentions in the matter but, so far, without success. All that we know to date is that, during the recent election a member of the Government intimated that it was the intention of the Government to acquire the railways, and whilst since then we have endeavoured to ascertain exactly what are the views of the Government the only information we have is the public announcement made in the Press that the Prime Minister, in an interview with a deputation from the National Union of Railwaymen is reported to have said that the Government contemplate the establishment of a Ministry of Ways and Communications to deal with the whole of the railways and the electrical industry, both for transport and power purposes, and that a Bill conferring the necessary powers upon the Government will be the earliest measure introduced into the new Parliament, and will be speedily passed into law. It has not been possible to elicit any information from the Government as to the method of future control, nor as to the terms under which such control will be initiated or exercised."

* * *

A report that showed a favourable financial position and a continued increase in numerical strength was placed before the members of the Railway Club, 92, Victoria Street, S.W., at the annual general meeting on Tuesday evening, February 4. Mr. Edwin J. Miller was re-elected hon. secretary and Mr. H. W. Bardsley, hon. librarian. Mr. J. B. Sherlock having retired from the position of hon. treasurer, Mr. K. Ffitch accepted office in his stead. Following the business meeting, Mr. H. L. Hopwood presented a very able paper, his subject being "The G.W.R. in Cornwall." The next general meeting of members is to be held at headquarters at 7 p.m. Tuesday, March 4th when Mr. F. J. Vickery, will deal with a popular topic "Single *v.* Coupled Express Locomotives." Mr. Vickery is to take up the defence of the former type.

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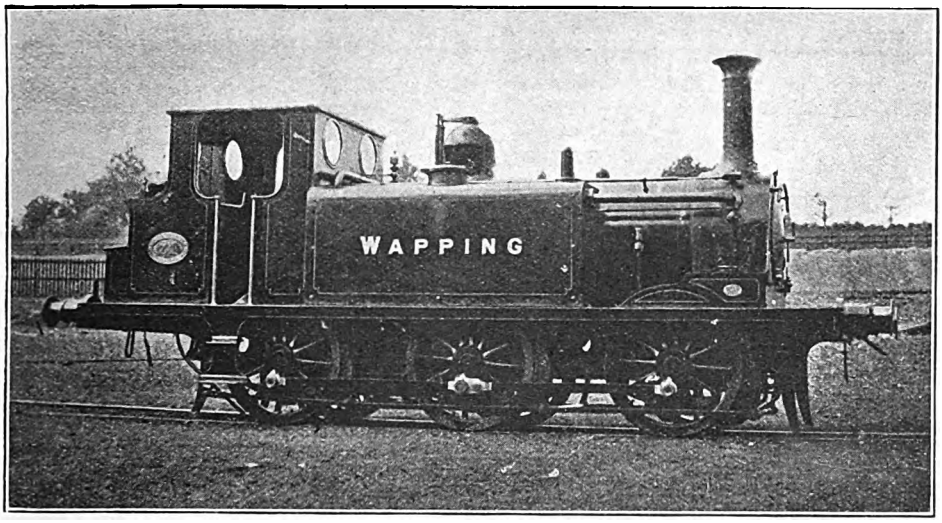

Photo.] [*Locomotive Publishing Co., Ltd.*

LONDON, BRIGHTON & SOUTH COAST RAILWAY ENGINE, No. 71 "Wapping."

The East London Railway:

ITS HISTORY, PROGRESS AND POSSIBILITIES.

By H. L. HOPWOOD.

IN this, its jubilee year, a brief account of the rise and progress of the East London Railway will be appropriate. This railway possesses features of rare historical interest, and it has had an eventful, if somewhat chequered, career; its record in the past having been one of continuous struggles against financial difficulties.

Regarded only from the standpoint of mileage, the system, with a total length of 5½ miles, is a very small one; but when it is stated it is one of the few railways in London proper that provide communication between the main lines north and south of the Thames, and that it is jointly leased by no fewer than six companies, its importance as a link in a through route will be at once recognised.

The East London Railway was incorporated by Act of May 26, 1865, for the purpose of connecting, by means of Brunel's Thames Tunnel, the railways on the north and south sides of the Thames. Included in the original proposal were "a great terminal station in Liverpool Street" and a branch to the Great Eastern Railway at Cambridge Heath; but these schemes were subsequently abandoned. Liverpool Street station was to be the joint property of the East London and Great Eastern Railways, and the two railways were to run, one above the other, as far as Bishopsgate, by which means it was estimated £250,000 would be saved in the purchase of land. In 1866 a subsidiary company, called the East London (Eastern Extension) Railway, was formed for the purpose of making a branch line from Whitechapel to West Ham. This project never materialised. A similar fate overtook a proposed branch to the Great Eastern Railway at Bethnal Green, which the East London Railway was authorised to construct by Act of 1876. In this case, however, the works were commenced, but afterwards abandoned through want of funds. Yet another abortive scheme was that for a connection to the North London Railway near Broad Street.

As actually constructed, the East London Railway consisted of a main line from the Great Eastern Railway at Bishopsgate to New Cross, at which place double junctions were formed with both the

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London, Brighton and South Coast and South Eastern Railways. There was also a branch from Deptford Road (now called Surrey Docks) to Old Kent Road station on the South London section of the Brighton Railway. This branch was carried across the Surrey Canal by a girder bridge having a central span of 80 ft. and two side spans of 16 ft. each. The bridge accommodated three tracks, the third being the up line from New Cross. The main line also crossed the canal by a very similar bridge.

The historic Thames Tunnel was originally built to carry a roadway under the river between Rotherhithe and Wapping, and was the first of the now numerous tunnels under the Thames. In its construction, a tunnelling shield was used for the first time. The Thames Tunnel Company was formed in 1824 with a capital of £200,000 and Marc Isambard Brunel was appointed engineer of the undertaking. There were to be two parallel tunnels with the wall between them pierced at frequent intervals by arched openings. The extreme width of each tunnel was 13 ft. 9 in.; the height from base to crown 16 ft. 4 in.; and the total length ¼ mile. The top of the tunnel was only about 15 ft. below the bed of the river.

Operations commenced at the Rotherhithe end February 16, 1825, and work went on steadily for 15 months, when there was an inrush of water. On January 12, 1828, water again invaded the works, but the hole in the river bed was successfully plugged with clay and gravel, as it had been on the previous occasion. By this time the funds of the Company were exhausted, and no financial help being forthcoming, the works were bricked up in August, 1828. This operation brought to a close the first chapter in the tunnel's history.

Later on, the Government advanced £240,000 for the prosecution of the work, and another start was made in March, 1836. Water broke in three times during 20 weeks, the last occasion being on March 1, 1838. By April, 1840, the shield had passed low-water mark on the Wapping side, and was within 90 ft. of the site of the northern shaft, when a subsidence took place, leaving a hole 13 ft. deep and 30 ft. in diameter. In the following August a driftway was driven right through from the tunnel, and, for the first time in history, men passed under the river from one side to the other. Brunel received a Knighthood in honour of the occasion. Nearly three years elapsed before the tunnel was completed; the opening ceremony taking place on March 25, 1843.

Commercially, the tunnel was not a success, and, as already stated, it was purchased by the East London Railway in 1866 at about one-fourth of the original cost and adapted for railway purposes.

Sir John Hawkshaw was appointed Chief Engineer of the railway. The line was opened in the first instance from New Cross (where there was an independent station alongside that of the Brighton Railway) to Wapping on December 6, 1869, and, under agreement, was worked by the Brighton Railway for 53 per cent. of gross receipts. This agreement was for a period of 21 years, dating from January 1, 1870. It was provided that the South-Eastern and London, Chatham and Dover Railways might, on six months' notice, participate in the agreement, but so as not to interfere with the control by the Brighton Railway.

The inaugural service was one of 23 trains each way between New Cross and Wapping. For running this, Mr. Craven built at Brighton Works in 1869 two 2-4-0 side tank engines, Nos. 51 and 109. Later on his successor, Mr. Stroudley, allocated some of the 0-6-0 "Terrier" tank engines to the East London line, and named several of them after stations on the railway, including the first of the class, No. 71, which was built in October, 1872, and appropriately called *Wapping*.

The opening of the Old Kent Road branch took place in 1871, and by 1876 the separate up line to the Brighton Railway and the two connections with the South-Eastern Railway at New Cross had been completed. In 1871 trains were more frequent, there being then 43 each way between New Cross and Wapping and 18 each way between Old Kent Road and Wapping.

From the date of opening to June 30, 1870, 421,820 passengers were conveyed, and by June 30, 1873, the total number had risen to 3,503,822. The line was, of course, then opened only as far as Wapping. Relations between the two companies

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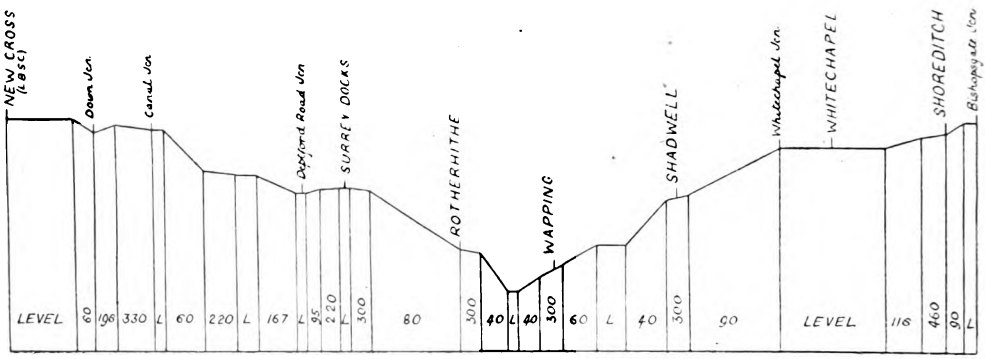


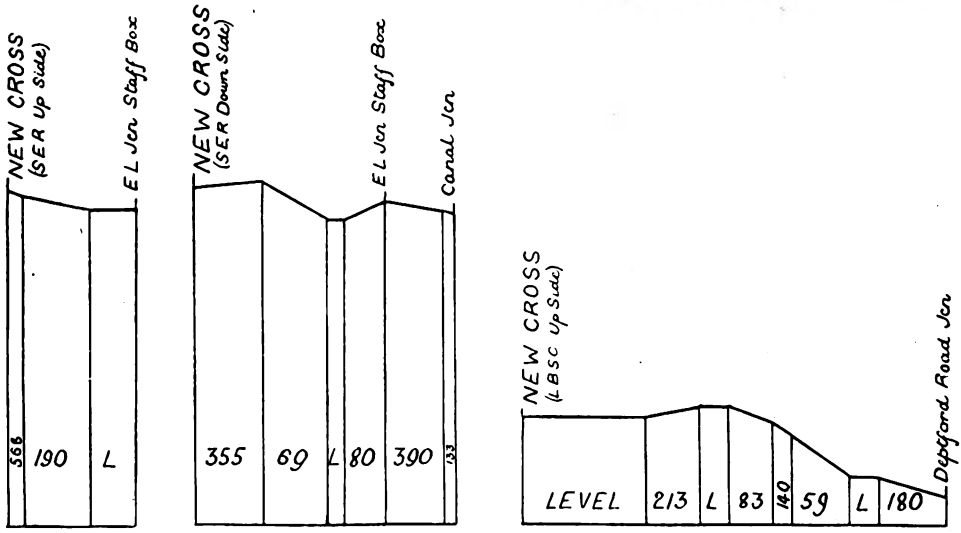
EAST LONDON RAILWAY GRADIENT PROFILE.

appear to have been somewhat strained in those days, for we learn that the East London Railway, being dissatisfied with the arrangements made by the Brighton Railway for working and developing the traffic, and failing to obtain any relief, appealed to the Railway Commissioners for a settlement of differences. Judgment was delivered in favour of the East London Railway on August 16, 1876.

The extension from Wapping to the junction with the Great Eastern Railway at Bishopsgate was opened April 11, 1876. This section involved some very heavy constructional work; the railway (which passed under the London Docks) being either in tunnels or cuttings nearly all the way to Shoreditch station. The cuttings necessitated massive retaining walls (in some places nearly 50 ft. high), and these are strengthened by double rows of cast iron struts. The difficulties met with are best described in Sir John Hawkshaw's own words :—*

"The railway had to be carried beneath the London Docks, and the conditions imposed by the Dock Company made that part of the work one of the very greatest difficulty. A coffer dam had to be made extending halfway across the Dock, and after the tunnel (for two lines of railway) had been built within it, the coffer dam had to be removed. After its removal a second coffer dam was made, within which to build the second half of the tunnel under the Dock. The difficulty of effecting the junction of the two tunnels in the centre of the Dock will be obvious

* "The Severn Tunnel: Its Construction and Difficulties" by T. A. Walker. Introductory note by Sir John Hawkshaw.



GRADIENT PROFILES.

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to those who have any knowledge of such works.

"The railway tunnel was successfully made through the Dock and beneath the Dock walls. The tunnel was also carried beneath the sugar warehouse on the north quay of the Dock, a work requiring great care, as the warehouse had basements and the floors over the basements were entirely supported on groined brick arches. The brick piers supporting these arches were all underpinned with concrete as far down as the foundation of the tunnel itself, after which, ground was excavated between the piers, and the basement then presented a most striking appearance when illuminated by the lights of the warehouse, the groined brick arches being supported on columns 60 ft. high. The brickwork of the tunnel was built round and among these concrete columns, which were afterwards removed wholly from within the tunnel, and the concrete, where it passed through the brickwork, was then cut out and replaced by brickwork. Other heavy underpinning works occurred on this railway, one of which I may also mention, where the tunnel passed at some depth below the brick viaduct of the Blackwall Railway."

The contractor for this work was Mr. T. A. Walker, who also built portions of the Metropolitan and District Railways, including the branch to the East London Railway; the Severn Tunnel, Barry Docks, &c. The cost of constructing the East London Railway amounted in all to about £3,200,000.

On the throughout opening to Bishopsgate in 1876, the Brighton Company's trains were extended to Liverpool Street, and they continued to run to that station until the end of 1885. During this time six or seven trains daily were working through to West Croydon.

It will be remembered that, on six months' notice being given, the South-Eastern and London, Chatham and Dover Railways were entitled to participate in the original agreement. This notice was given by the South-Eastern Railway in 1879, and on April 1, 1880, that Company commenced running trains over the East London Railway. The service was between Addiscombe Road and Liverpool Street, and was one of 15 trains each way on weekdays and seven on Sundays. The engines used were 0-4-4 Stirling tanks, specially fitted with condensing gear and short chimneys.

The year 1884 was an eventful one in the history of the East London Railway, for it was from October 1 that the present lease of the undertaking dated, Parliamentary powers for this having been obtained two years earlier. The following is a summary of the principal clauses embodying the agreement:—

"The East London Railway is to be connected with the Metropolitan and District Railways by a junction at Whitechapel, and on this being effected, to be leased by the five companies, viz., Brighton, South-Eastern, London, Chatham and Dover, Metropolitan and District, and worked as a line connecting the railways south of the Thames with the Metropolitan system. The Great Eastern to be asked at the proper time to join the other companies in the lease. The companies to become joint lessees, with equal rights, control being vested in a Joint Committee. The Brighton Railway, being in possession and working the East London line under agreement, is to maintain and staff the line."

"The rights of the lessee companies and of the Joint Committee under this agreement are limited to the East London proper, *i.e.*, there is to be no right to any one of them to run trains over any part of the Brighton, South-Eastern or Chatham, unless with their previous assent; the intention being that the East London and Metropolitan traffic is to be worked distinct from the traffic of the above southern railways by exchange stations at New Cross, due facilities for through booking and interchange being provided."

"The terms of lease to be a minimum net rental of £30,000 per annum to the East London, the leasing companies undertaking all expenses, including rent or toll to the Great Eastern. As soon as the gross traffic over the East London increases to a point, which, allowing 44 per cent. for working expenses, gives a net income sufficient to cover the £30,000 per annum, the excess of such gross traffic, less 44 per cent. for working expenses, shall belong to the East London."

The Metropolitan and District Joint Line from Aldgate to Whitechapel Junction, referred to above, was opened

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October 6, 1884, and was the means of bringing a large increase of traffic to the East London Railway. Metropolitan trains commenced to run at 20 min. intervals between Hammersmith and New Cross (South-Eastern station); and District trains at 30 min. intervals between Hammersmith, &c., and New Cross (Brighton station). Some of the Metropolitan trains worked through to Blackheath, but this arrangement did not last very long. At the same time the South-Eastern Railway withdrew its Addiscombe Road—Liverpool Street service.

In the summer of 1884 an interesting experiment in the form of through trains between Liverpool Street and Brighton (via the East London line, and worked by Brighton engines) was tried, but apparently the service did not attract sufficient through passengers, for it was not repeated in subsequent years. On the outward journey, the train left Liverpool Street at 10.35 a.m. and was due at Brighton 12.58 p.m. In the opposite direction, Brighton was left at 11.30 a.m. and Liverpool Street reached at 1.31 p.m.

After 1885 Brighton Railway trains ceased to run into Liverpool Street, the working being taken over by the Great Eastern Railway instead, but the former company continued to work locals between Shoreditch and New Cross, and also Peckham Rye. Commencing January 1, 1886, there were 18 Great Eastern trains each way from and to Liverpool Street. Eleven of these ran to New Croydon, the others terminating at New Cross. On Sundays there were 10 trains each way between Liverpool Street and New Cross only. This service continued with but little variation until electrification of the East London line in March, 1913, except that after June 30, 1911, the trains did not run south of New Cross. Five Great Eastern 0-4-4 tank engines, Nos. 59, 101, 233, 586 and 588, were employed on this service. Built between 1879 and 1883, they were in 1885 fitted with condensing gear specially to work over the East London line.

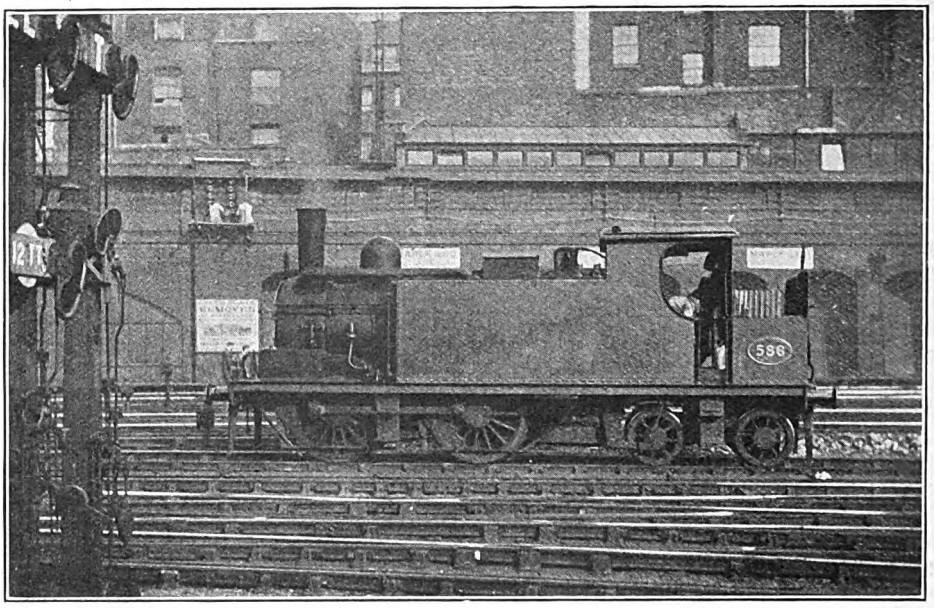

Photo.] GREAT EASTERN RAILWAY TANK ENGINE, No. 586. [*G. J. Prentice.*

In course of time, the East London Railway has passed through many vicissitudes. The affairs of the company were administered by a Receiver from 1878 to 1889, but after the latter date traffic gradually improved, and in 1903 gross receipts amounted to £56,100—the high-water mark in the days of steam traction.

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Thereafter the takings steadily declined, until in 1912 they were only £38,009. Road competition and the gradual withdrawal of through trains, due to electrification of "feeder" lines, were mainly responsible for this state of affairs.

The District Railway withdrew its Hammersmith and New Cross service on August 1, 1905. It had been running 37 trains per day each way over the East London Railway, and partly to fill the gap, the Brighton Railway provided 28 trains between New Cross, Peckham Rye and Shoreditch, but the Peckham Rye trains ceased to run when the Brighton Railway adopted electric traction on its South London line.

Following the suspension of District trains, withdrawal of the Metropolitan Hammersmith—New Cross service as from December 3, 1906, was next announced, this being due to electrification of the Hammersmith and City line. In place of the Metropolitan trains, the South-Eastern and Chatham Railway ran a limited service between its New Cross station and Whitechapel. At times an ex-London, Chatham and Dover engine and coaches were employed, and this appears to have been the only occasion on which the London, Chatham and Dover Railway, as one of the lessee companies, took an active part in the working.

In 1912 passengers were 75 per cent. fewer than in 1900, and it was already realised that electrification of the line and restoration of through trains were inevitable if the decline of passenger traffic was to be arrested. But it was a question of which system of electrification to adopt; the Metropolitan and District Railways, at one end, having introduced the third rail on their lines; and the Brighton Railway, at the other end, the overhead wire. After much consideration had been devoted to the subject, it was decided the third rail system was preferable. Accordingly, the work of conversion was put in hand and the new method of traction was brought into operation March 31, 1913. Current was supplied from Lots Road generating station through substations at Whitechapel and Surrey Docks. The Old Kent Road branch was not electrified, and becoming disused, the rails were removed. Other sections not electrified were the up line connections to the two New Cross stations, these now being used only by goods trains.

The Great Eastern Liverpool Street—New Cross trains were withdrawn, and, so far as passenger traffic was concerned, the Metropolitan became the sole working company, with trains, at first, between South Kensington and New Cross. Very soon, however, the old Hammersmith—New Cross service was revived. These trains now run at 15 min. intervals and work alternately into the Brighton and South-Eastern stations at New Cross. Every 15 min. there are also two-coach local (Metropolitan) trains between each of the latter stations and Shoreditch; so that a total of 12 trains an hour (six in and six out) is dealt with at both stations; Whitechapel and Shoreditch have eight an hour both ways; and stations Surrey Docks to Shadwell inclusive, 12 an hour. Now that the Great Eastern trains are withdrawn, it is no longer possible to book to or from Liverpool Street. This loss is more apparent than real, because the Hammersmith—New Cross trains serve the Metropolitan station at Liverpool Street, as they did formerly.

One beneficial result of electrification was an immediate increase of receipts. In 1913 (when electric trains had been running only nine months), gross earnings amounted to £46,215, or £8,206 more than in the previous year. Last year (1918) the number of passengers was three times as many as in 1912, and receipts more than doubled during the six years.

By special arrangement, the Great Eastern Railway exercises running powers over the South-Eastern and Chatham Railway between New Cross and Hither Green Sidings, and works a regular service of goods trains to and from the latter point. It also has its own goods depôt adjacent to the Brighton station at New Cross. There is a considerable exchange of traffic at that station, as in addition to goods trains, Great Eastern engines work a number of trips with horse boxes, and other passenger-rated traffic. Goods traffic from the Great Eastern Railway to the southern lines used to be taken into Liverpool Street and out again to the East London Railway via Bishopsgate Junction, but this method of working was altered in 1900, when the Spitalfields hoist was brought into use. This hoist,

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or lift, connects the high-level Bishopsgate Goods station with the East London Railway, the difference in levels being about 40 ft. The hoist is worked by hydraulic power and accommodates two wagons at a time.

In the neighbourhood of New Cross, the "lay-out" of the East London Railway becomes very complex. At Deptford Road Junction the up goods line from the Brighton station joins the main line. Deptford Road was also the junction for the now abandoned Old Kent Road branch, and the three tracks ran parallel until Surrey Canal bridge was crossed. The course taken by this derelict branch may be plainly seen as one passes the junction. At Canal Junction the main line divides, a double line going off to the right to the Brighton station, where it terminates as a single line at the back of the down platform. The line which leaves Canal Junction on the left leads to the South-Eastern station, and very soon—at East London Junction Staff signal-box—this again splits, in the form of connections to the up and down sides of the station. The former is used by Great Eastern goods trains from Hither Green, but the down side connection becomes a single line in the strictest sense; being used by up and down passenger and down goods trains. At New Cross, passenger trains are accommodated at a bay on the down side. A prominent landmark was the old East London Junction Staff signal-box; a wooden affair, with a long gallery down which the signalman used to walk to exchange the train staff. It still stands as a derelict (minus the wooden gallery), but has been replaced by a box nearer to the line side. A considerable portion of the signalman's working life must have been spent in walking up and down the platform to meet the trains, and when these increased in number it became necessary to place the box in a better position. The present arrangement enables the staff to be exchanged without the signalman leaving the box.

Among curious stations in London, Wapping may well be included. The platforms are probably not more than 7 ft. wide, and they must have been a source of danger in the days of steam-worked passenger trains, when the carriage doors opened outwards. The Metropolitan carriages now used, have sliding doors that do not project, so that the danger is lessened; but for present day needs, the platforms are still inconveniently narrow. Exit to the street is by means of two hydraulically-worked lifts (which seem to be in a perpetual state of leakage), or by two spiral staircases, which apparently date from the opening of the Thames Tunnel in 1843.

The East London Railway has some heavy grades, though not for any great distance. Gradient profiles appear on page 218, from which it will be seen the steepest inclination is 1 in 40, this occurring between Shadwell and Wapping and through the Thames Tunnel.

Distances from Bishopsgate Junction are as follows:—

	m.	ch.
Bishopsgate Junction	0	0
Shoreditch Station	0	9
Whitechapel ,, ...	0	46
,, Junction	0	57
Shadwell Station	1	15
Wapping ,, ...	1	55
Rotherhithe ,, ...	2	1
Surrey Docks ,, ...	2	44
Deptford Road Junction ..	2	58
Canal Junction	3	19
East London Down Junc. with L.B.S.C.R.	3	43
Deptford Road Junc. to E.L. Up Junc. with L.B.S.C.R.	0	74
Canal Junction to S.E. & C.R. Down Side	0	49
Canal Junction to S.E. & C.R. Up side	0	46

It is to be regretted that the branch to near Bethnal Green was never finished, as by means of this, trains between north and south would be enabled to run direct over the East London Railway without the necessity of reversing at Bishopsgate Junction. In the case of goods traffic, much delay caused by splitting up trains and sending wagons (two at a time) via the Spitalfields Hoist would be avoided. At the last annual meeting, the Chairman, Lord Claud Hamilton, emphasised these points, and stated that a very small sum would be necessary to complete the branch. Should this work be carried out, the East London Railway's sphere of usefulness would be increased still further, and important traffic developments might be expected.

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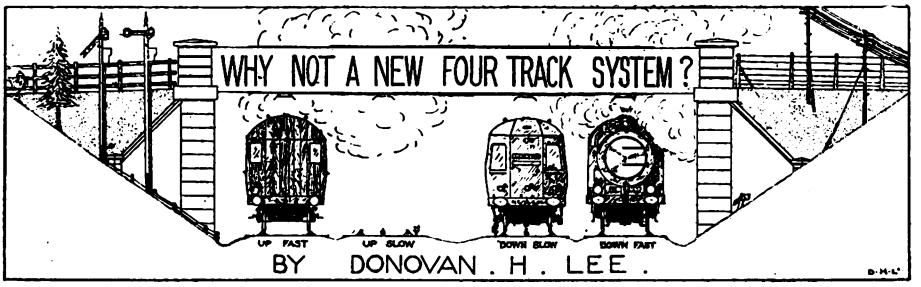

THERE are only three possible systems of four-track working, and it is to discuss the merits of the third that this article is written. It is surprising that the third possible system (Fig. 3) has seemingly been overlooked up till now. However, the reverse system (Fig. 2) seems only to have had its advantages recognised about 30 years ago, when flying and burrowing junctions received serious attention. The Fig. 2 system, that of having the fast roads on the inside and the up and down slows on their respective sides, has always been thought of as the best four-track system, and the reverse system, that of having the slow tracks together and the fast on the outside, has received no practical test, and yet, I submit, it is quite as good, and has many advantages over the Fig. 2 system.

It would seem that this method of working has never received due consideration, and it is somewhat surprising that it has never been adopted before. Naturally it seems as if there is some great drawback, not to be seen at first glance. I do not think this hypothetical drawback is existent, and I will try to show it by comparing the system with the others.

The article is divided into five parts, each for the consideration of a special system or feature of the method of working and track lay-out in different cases :—

(1) Local stations.
(2) Junctions.
(3) Stations with goods depôts and terminal lines.
(4) Termini.
(5) Marshalling yards and engine sheds

(1) Local Stations.

The Board of Trade now would never consider allowing level crossings over four lines, so it is fair to allow that in all cases there will be bridges, either overline or underline. This makes it possible to have

METHODS OF WORKING 4 TRACK SYSTEMS.

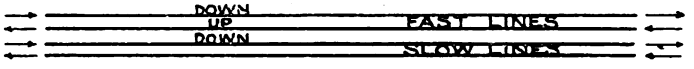

Fig. 1.

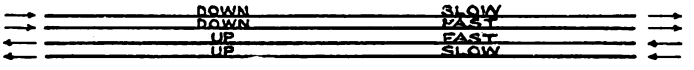

Fig. 2.

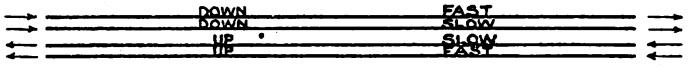

Fig. 3.

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only one platform, an island, in between the slow roads and have the booking office at road level, with a staircase either up or down to platform level, according as the bridge was over or underline. No footbridge would be necessary, and it would be better for the station staff, as there would be no need for them to cross the line to get to the other platform.

This is an important item, as it not only saves the porter having to cross the line, but also the railway company the waste of his time in taking milk cans and luggage from one platform to the other, a very common occurrence where the station has an entrance on one side only. It would be advisable to have a lift from platform level to road level for milk cans.

hanging the slow roads as in Fig. 4, he would be able to see along the line in an end-on view in the other, or left, direction. Where the slow lines were electrified, trains could be reversed and crossed on to the other track without interfering with the fast traffic whatsoever. With the Fig. 2 system this cannot be done. With steam, slow trains could be reversed without interference of the fast lines, if the crossover was laid as shown marked B. in Fig. 5.

(2) Junctions.

At junctions there are more or less the same advantages as at local stations.

Most branch trains connect at the junction with a slow or semi-fast train, in

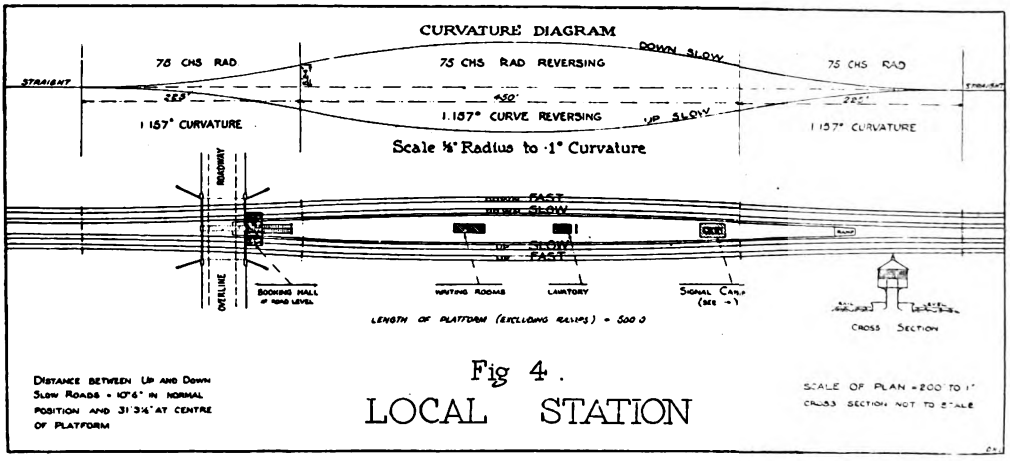

Fig 4.

LOCAL STATION

Both pairs of roads would necessarily have to be curved to make space for the island platform (Fig. 4).

The 10-ft. space would be between the slow roads and the 6-ft. between the same direction tracks, the curvature being only 75 chains radius to get in a 600-ft. platform, with a maximum width of 26 ft. 5 in. and a minimum of 8 ft., and still have no waste of land between the platform ramps and where the slow roads re-assumed their normal position. The signal cabin, by this system, would have a superior position to the possible positions by any other system. Fig. 4 shows the cabin at the end of the platform, from where the signalman has an end-on view to all the trains on the right side of the box, and if the cabin was elevated and slightly over-

which case passengers from the branch by this system would not have to go over the footbridge to reach the connecting train in either direction, meaning besides a save of luggage carrying, a chance to make connecting times of branch trains sharper, as no allowance need be made for the time taken by the slow walking and gouty passengers in crossing the footbridge; a trying time for the staff when the main-line train is waiting for a late branch train, and very probably a more trying time for the passengers. B′ B″, two cross-overs on Fig. 6, would only be laid in where there were locomotive sheds or carriage sidings on the branch.

The advantage of having these on the branch would be that light engines and carriage trains off the main line could be

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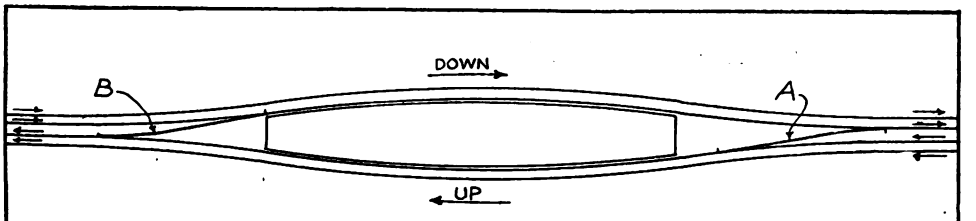
run to and from the main line without crossing any lines on the level. Branch trains could also run in both directions through from the main line slow roads to the branch without cutting the fast lines.

In the case of unimportant junctions, the fast line platform (dotted in Fig. 4) would not be built, so in these cases the station would consist of one large island platform with bay, and would be a decidedly better designed station than would be possible with the other two systems.

(3) STATIONS WITH A TERMINAL LINE AND GOODS DEPÔT.

At stations where trains would terminate journeys, there would be a bay in the island platform with a reversing loop outside, and the bay connected to both the slow roads. These in turn would be connected to the fast lines by cross-overs, so that the bay would be connected to all the tracks, and a terminating train could reverse in the loop, and leave again on to the slow line without blocking any section of the line while waiting or reversing. The bay would be very useful for the goods depôt if the goods depôt was in the position shown in Fig. 7, as an up train could back into the bay, and then shunt into the yard when the down lines were clear for its crossing. In this case the locomotive would, after backing into the bay, pull the train on to the loop, and get on the other end, to be able to push trucks into the yard. If passenger trains were frequently in the bay, an extra line might be put in to make a double track bay to enable the goods train to get off the main line without delay. The line running into the bay is made longer to allow for the length of a goods train. Down goods trains would, of course, have no difference to ordinary procedure, excepting that it would be an advantage to run goods trains on the fast lines whenever possible, so as not to have to cross the fast lines from the slow into the yard. Where the slow lines were electrified it would be more likely that goods trains would run on the fast or through roads, so it would be no disadvantage to have a goods yard next to the fast lines. It might be advisable in some cases to have one or two carriage sidings alongside the loop so that trains could be left there during slack hours, and could be put into the bay quickly. For one siding it would be best to have a three-throw at the switch marked X. on Fig. 7, and have the carriage siding parallel to the run-around loop, though the loop itself would become a siding when the carriages were run on to it for the engine to get on the other end. Whenever possible, it would be a great advantage to have the goods depôt in between the slow roads, but this would mean having the road entrance to the yard in the centre of a bridge, with an incline into the yard, which would be rather a disadvantage. For shunting it



Local Station Crossovers.

NOTE - Where Electric Suburban trains terminate a trailing Cross-over to be laid on the town side of the station - i.e. in above illustration Cross-over B to be laid in only FOR STEAM Suburban traffic both Cross-overs to be laid (viz: A & B).

Fig. 5.

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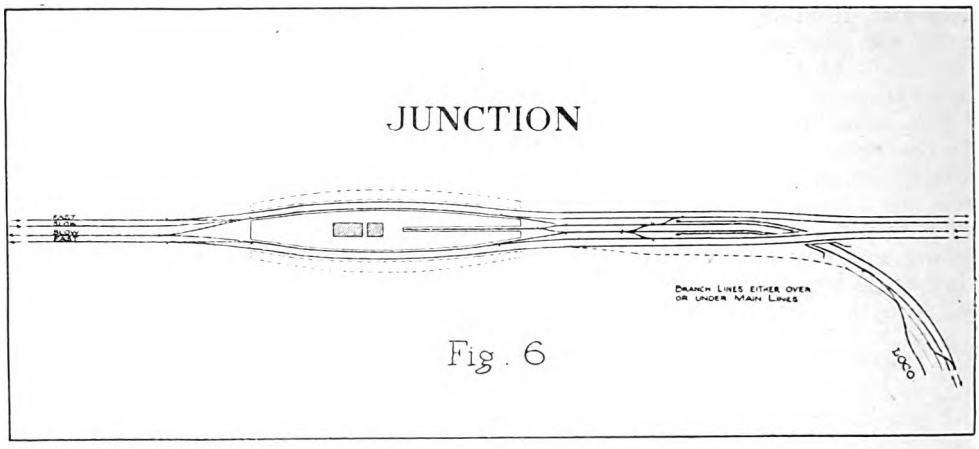

Fig. 6

would be much more convenient, however, to have the yard in between, and this yard would be the easier in which to perform shunting.

In the other systems all yards must have a diamond crossing across at least one of the roads, *i.e.*, with the Fig. 2 system (fast lines inside) a goods yard on the up side must have a connection to the down slow cutting three other lines, the up and down fast, and the up slow.

(4) Termini.

There cannot be a standard terminus permanent way design, because local conditions are the controlling factor of the design, and the proportion between the main line and suburban traffic, which varies always, controls the platform arrangement. Figs. 8A and 8B are two possible arrangements which reap the advantages of the method of working, and it will be seen that the permanent way arrangement is quite as good as the plans of termini now working on the other systems. The carriage roads that go over or under the slow roads, to bring and take away empty main line trains, are not absolutely necessary if local surroundings made it difficult. Carriage trains in this case would come from the up arrival platforms to the down slow, and from the down departure platforms to the up slow, crossing the other slow line on the level in each case. If the slow lines were electrified it is probable that the frequency of the service would make it impossible to run carriage trains on the slow (electric) lines, in which case it would be far better to have the flying connections than have the two carriage roads crossing both slow lines in each case. The carriage roads would cut in a diamond crossing on the level, where there were flying or burrowing connections. In this case main line locomotives, after arriving on the up side, could come over to the locomotive sidings on the down departure side, by making use of the curves A′ and A″ (Fig. 8A). This would join the two inclines by a stretch of level slightly nearer ordinary rail level than the level of the diamond crossing of the carriage roads. It will be easily seen that the great advantage of this system is that suburban trains can change from up to down road without interfering with the main lines at all, and considering what a big proportion the suburban traffic is to the whole, this is a great advantage. The locomotive siding need not necessarily be in the position shown on Figs. 8A and 8B. This, however, is the position used at most London termini where the locomotive sidings are next the terminus—Paddington, King's Cross, &c.—so I have adopted it here.

(5) Marshalling Yards and Engine Sheds.

Marshalling yards and engine sheds are a peculiar combination, but this method of working gives approximately the same advantages to each case, and I think it will be agreed that they are overwhelming. In Fig. 9 it will be seen that there need not be a single switch on either fast line at the marshalling yard, and that the running shed in the centre of the up and down yards

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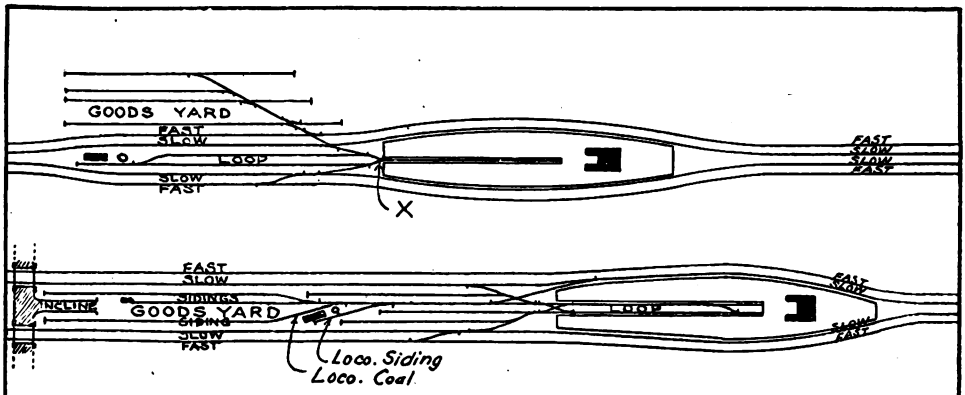
would be accessible from either yard without the crossing of any passenger roads. The engine shed being in the centre, too, fills up the large quadrilateral of waste land where the necks of the humps are situated. There is no waste of land at all, and by the use of the shunting spurs the two yards can be worked absolutely independent of the passenger lines, and independent of each other. The locomotive sheds can be reached direct from the passenger lines, *via* the engine waiting lines which are alongside the coaling stages, and under the water towers. The waiting roads would be used by the main line goods locomotives to wait, just before arrangement. It will be noted, too, that there is a defective wagons siding on each outward yard, with a dead-end and a crossover leading out. For engine sheds and carriage sidings, apart from other sidings, the same advantages obtain for the connections to the slow lines. There would be a facing and a trailing connection to each slow road, the points being the length of the sidings apart. The fast lines in this case also would have no points or diamond crossings at all.

Conclusion.

All the advantages of this system—and they cannot be enlarged upon too much—



LOCAL STATIONS
WITH A TERMINAL LINE AND A GOODS DEPÔT.
(ALTERNATIVE DESIGNS).

Fig. 7.

taking away a goods train, and after having coaled. The water towers would, supply both the coaling stage road and the waiting road. The waiting lines would, except in special circumstances, be only used in an outward direction, and the coaling roads only in an inward direction. The locomotive coal for the coaling stages would be pushed over the hump as an ordinary goods train. This would allow of an easy gradient from the last points in the outward yard to the high level of the coaling stage. The level of the points there would not be much lower than the level of the hump.

Both yards in Fig. 9 are exactly similar, but this must be taken only as a possible

lie around the two facts that (1) it is very easy to connect the slow lines for reversing and shunting, and (2) the island platform arrangement is very convenient for passengers, and economical for the railway company. Where there is a heavy suburban traffic, and trains terminate their journeys at various stations, it is a tremendous advantage to be able to reverse easily. The Fig. 2 fasts-on-the-inside system is recognised of late years as being an advancement on the Fig. 1, or two-and-two system. For suburban traffic, though, the new method of working would be better than the Fig. 2 system. If flying junctions were adopted wherever lines diverged, there need be no points at all on the fast

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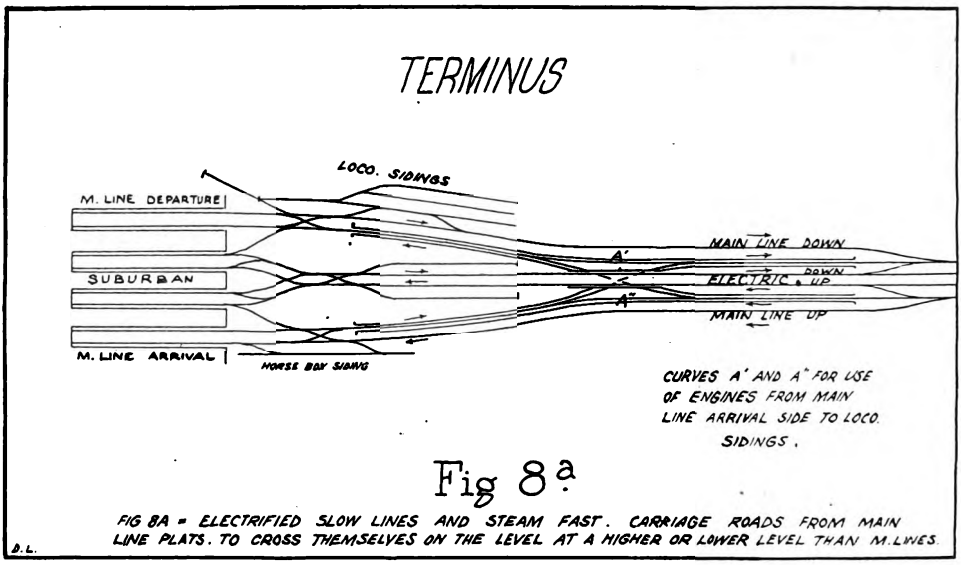

Fig 8a

FIG 8A = ELECTRIFIED SLOW LINES AND STEAM FAST. CARRIAGE ROADS FROM MAIN LINE PLATS. TO CROSS THEMSELVES ON THE LEVEL AT A HIGHER OR LOWER LEVEL THAN M.LINES.

D.L.

lines. With the Fig. 2 system there must be crossings where trains reverse. At goods depôts there would be points or diamond crossings, where the yards were on the outside, but as this would only be necessary in the case of good-sized yards, it would not often occur. Where the yards were large enough, there could be a flying junction from the slow lines. Sometimes it would be better to have the fast line on the side of the yard at a higher or lower level than the ordinary rail level. In that case all the connections from the slow lines would lead to the yard on the level, crossing over or under the fast line. This would be by far the best way where it was possible to bring the fast line higher or lower, with an easy gradient. Where it was necessary to connect the fast line in question to the goods yard, it would have to be over the slow line, from where the gradient started. Another way would be to have a line from the commencement of the incline, from the fast line, and on the outside of it, to the yard. In the case of carriage sidings this would be useful. A seeming disadvantage, but not a real one, lies in the fact that flying or burrowing junctions must be made where lines diverge.

With the fasts-on-the-inside system, however, there is the same disadvantage, yet this method of working is used in practically all new widenings. There is a

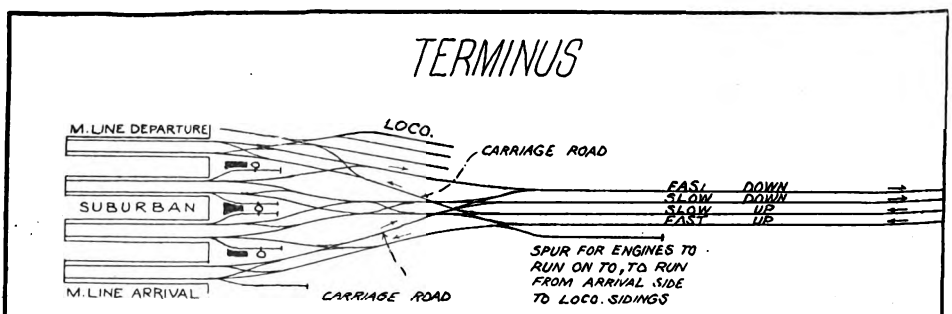

Fig 8b

FIG 8B = STEAM TRAFFIC ONLY AND CHEAPER CONSTRUCTION FOR CARRIAGE ROADS THAN 8A.

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disadvantage to the fasts-on-the-outside system, in that wherever there were private sidings there would have to be a diamond crossing across the near fast line to connect the siding to the slow line. This could be partly obviated by having the connection on the fast line itself, and as these sidings are only stopped at once or twice a day by goods trains, these could run over the fast line on this section. There are not enough private sidings to call this a great disadvantage, but it is a point to consider. Another point to consider, and a great one, is that with carriage sidings and engine sheds between the slow lines, unless allowance was made for expansion in necessity, there would have to be the unpleasant job of slewing either the two up or two down main lines.

For marshalling yards, carriage sidings and running sheds, the great advantage of this system is unquestionable. No other can compare favourably with it. In all three cases, if desired, there need be no connection or diamond crossing on the fast lines, and no flying junctions would be necessary. Neither of the other systems can claim this, and with the fasts-on-the-inside system one crossing has to be made over both fast lines to get connections to both slow lines.

With the two-and-two (Fig. 1) method of working, if the carriage sidings or engine sheds were on the slow lines side, there would still have to be a diamond crossing across the outside slow road from the sidings. Another advantage of this method of working is that where there was a heavy traffic there could be a fifth track between the slow lines, which would be used in either direction, according to the pressure of traffic. This line would be practically a reception road, as it would have to merge into the other lines at stations, unless the island platform arrangement was to be sacrificed, with its advantages.

In conclusion, it will be agreed, I think, that this system has great possibilities, and that it compares very favourably with the two present systems in operation. The fasts-on-the-inside system was only adopted of late years, yet its adoption was possible ever since four-track systems were inaugurated. This system is in the same position now that the other system was then.

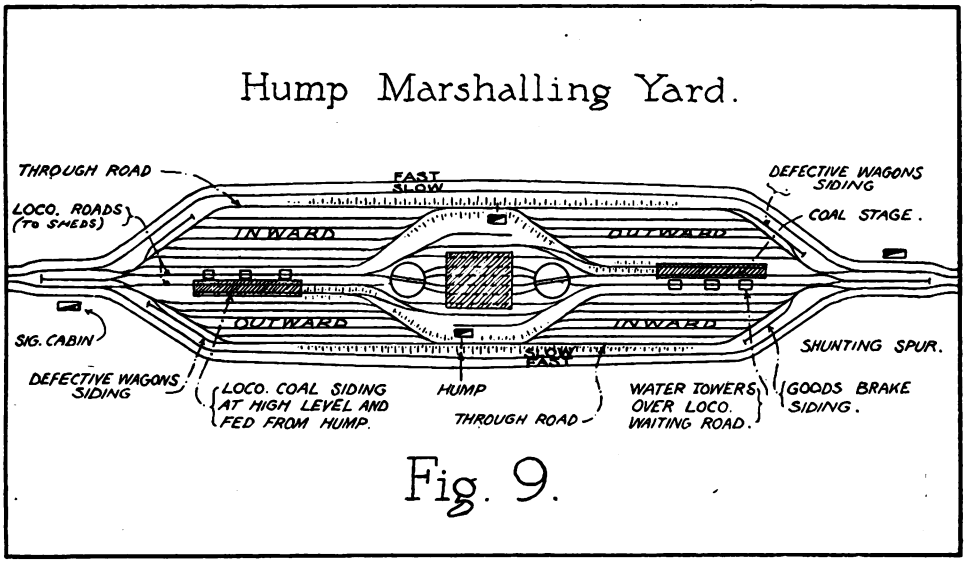

Fig. 9.

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The Railway Portrait Gallery.

Elliott] [*& Fry.*

Mr. CHARLES ALDINGTON, C.B.E.,

Appointed Assistant General Manager, Great Western Railway.

Mr. Charles Aldington, C.B.E., joined the staff of the Great Western Railway in 1876. On January 1, 1910, he became Superintendent of the Line. Now he has been appointed Assistant General Manager. Mr. Aldington has visited the United States and Canada several times, and takes a great interest in American railway affairs. He has also familiarised himself with Continental railway practice on business visits to Italy, France and Germany. With a great grasp of detail regarding every branch of his own department, Mr. Aldington takes the keenest interest in railway development in its broadest sense. In fact, railway work and study may be said to be his one recreation. In view of his broad outlook it is not surprising that he has been selected to fill the newly-created post of Assistant General Manager, which, owing to the amount of time a British railway general manager now has to give to attending Railway Executive meetings and Board of Trade Labour Conferences, is an appointment which bids fair to become a fairly general one on British railways.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

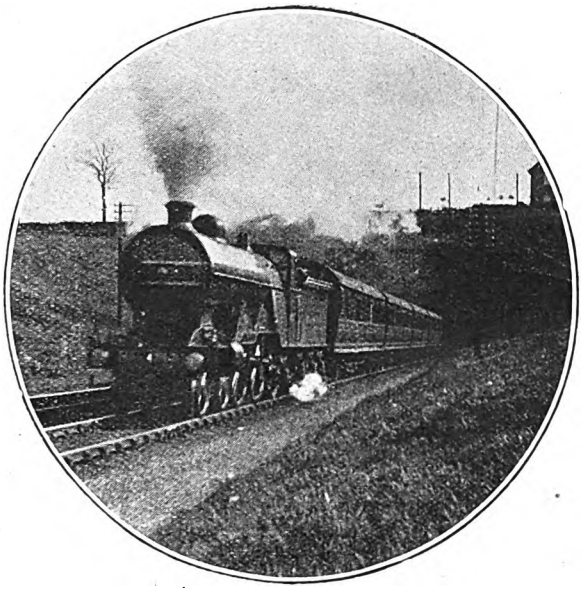

Photo.] [*K. A. C. R. Nunn*

GREAT NORTHERN RAILWAY.

Express train emerging from Hadley Wood Tunnel.
4-4-2 Engine, No. 1439.

BEFORE outlining in detail some further suggested schedules for post-war *trains de luxe* in this country, I wish first to deal with an interesting letter which I have received from Lord Monkswell in connection with the comments which I made in the February issue on his own proposals. It may be remembered that I questioned the feasibility, day in and day out, of the timings outlined in his book "The Railways of Great Britain," on the ground that insufficient margin had been allowed to cover *en route* delays, and thus to secure punctual operation. In his letter to me Lord Monkswell deals with my criticisms under various heads, which I will now quote and comment upon briefly.

"*Engine.*—On the Nord frequently," he writes, "and once on the Caledonian, I have seen engines go on for any time up to a quarter of an hour developing 23 to 26 calculated h.p. per ton of engine weight. This was in all cases without the steam pressure varying greatly or the water getting low, and there was no apparent reason why such work should not have continued indefinitely. But to be on the safe side I have assumed an engine of 75 tons to develop 1,500 h.p.—only 20 h.p. per ton." To this I would reply that the presence of an observer on the footplate, recording the performance, invariably stimulates exceptional work. It is a well-known fact that the remarkable results attained in the testing of pioneer locomotives of a class are rarely borne out in average actual practice by those locomotives as a whole. Further, it is possible for the locomotive, in common with the steamship or any other type of steam engine, to be worked up to feats well in excess of its designed capacity. I do not contend that this was always the case on the occasions when Lord Monkswell made the observations to which he refers. But I do repeat that the Northern Railway of France—before the war the most progressive line in Europe in respect of speed—had no higher scheduled speed on their system than 61·8 m.p.h., in face of the proved capacity of their locomotives for tractive feats in excess of the best ever yet recorded in this country, and this over a line of no worse average grading than our English Great Northern. It was on such timings that Lord Monkswell recorded these feats, and no better proof

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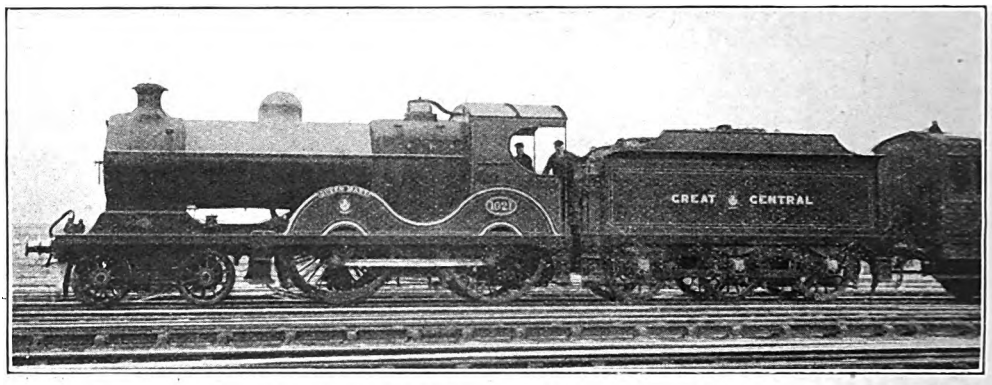

Photo.] GREAT CENTRAL RAILWAY. [*P. F. Cooke.*

Rebuilt Superheater Locomotive, No. 1021, "Queen Mary," with extended smokebox.

could be afforded of my contention that reasonable margins must be allowed over and above minimum running times, if punctuality is to be assured. My own suggested times contemplate the use of existing locomotives, as readers will have noted, and are based on a close study of recorded running during well over 300,000 miles of travel.

But let us take Lord Monkswell's second point: "*Service Slacks.*—In order to avoid meticulous calculations," he continues, "for slight service slacks running perhaps to a few seconds, I have given big allowances for the severe slacks where serious reduction of speed is necessary. For instance, you will observe that I have allowed for a dead loss of 5 mins. for passing Preston. With regard to the service slacks you enumerate, some of them must be very slight indeed, for the details of special runs on the London and North-Western Railway published in the *Engineer*, of February 6, 1914, show that the trains passed Wolverton, Weedon and Wigan at about 70 m.p.h. Any slackening too, between Beattock Summit and Strawfrank Junction must be of the slightest possible kind." In answer to this I would say that Lord Monkswell is evidently unaware of the restrictions to 50 m.p.h. recently imposed on expresses at both the bridge over the carriage works sidings at Wolverton, and

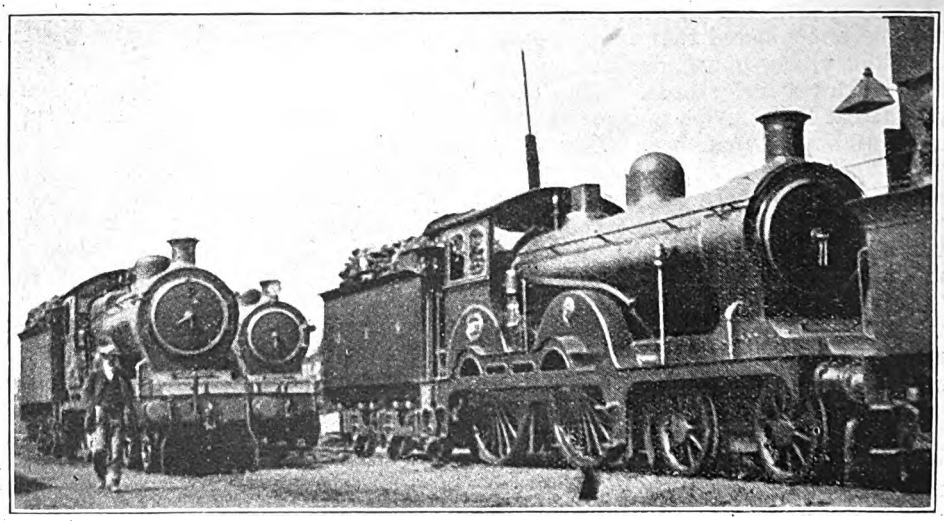

Photo.] GREAT EASTERN RAILWAY. [*R. S. Warner.*

4-4-0 Locomotives, Nos. 1877, 775 and 1826, outside Norwich Thorpe Sheds.

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on the south side of Weedon ; this may be an excessive figure, but neither of these points, any more than the other stations or junctions named by me, provides perfectly safe and comfortable travelling at speeds greatly in excess of a mile-a-minute. Personally, I am very much opposed to high average speeds secured as a result of negotiating curved portions of line at dangerously high speeds. The Preston accident of 1896 arose directly from this cause, and did more to retard the development of high-speed schedules in this country, then in a most promising stage, than any other event prior to the war. The Salisbury disaster of 1906 was exactly similar in character. My own suggested *i.e.*, the pressure of the wind against the coaches forcing all the wheel-flanges against the lee rail. Again, the high percentage of humidity in the atmosphere of this country is bound to affect locomotive adhesion to a certain extent on a great many days in the year, and in any case to a greater extent than in France. This has been advanced as one of the reasons why the three 4-4-2 French compounds on the Great Western Railway were not able to perform such proportionately good work in England as in their own native sphere, their adhesion weight being insufficient, but to what extent this is actually true I should not like to say definitely.

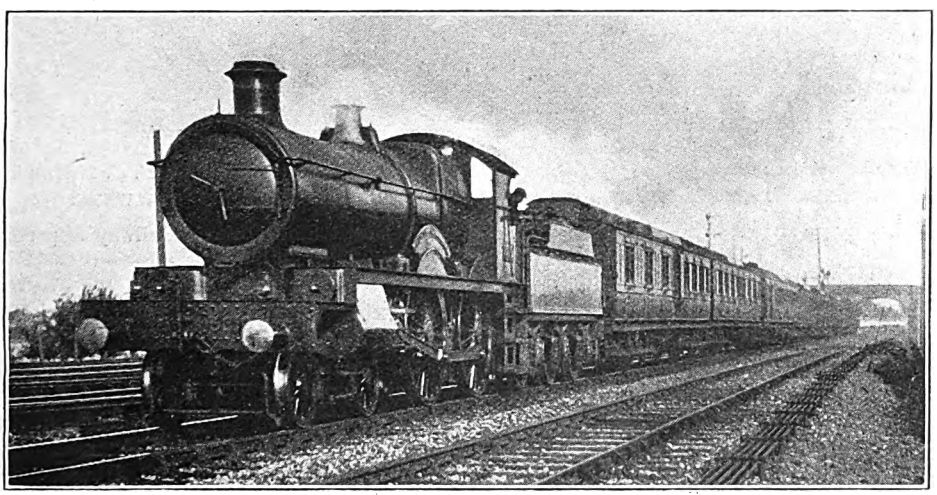

Photo.] GREAT WESTERN RAILWAY. [*H. T. Worlock.*

4-4-0 Locomotive, No. 3812, "County Cardigan," on down South Wales Express, near West Drayton.

times, therefore, have taken all these slacks, of whatever degree of severity they may be, carefully into account.

The letter then continues : "*Weather Conditions.*—So far as I am aware, it would need exceptionally bad weather to raise the resistance above 24 lb. per ton at 78 m.p.h., which is the basis of my calculations." I am not in a position to dogmatise on the point, but I should imagine that a strong westerly or south-westerly side-wind, which is largely a prevailing wind in this country, and particularly affects all lines running south and north, might easily occasion a greater resistance than this through flange friction,

Lord Monkswell then proceeds : "*Shap and Beattock.*—You speak of the 'meagre margin over the 78 m.p.h. average allowed in respect of such climbs.' You will see that you have made a mistake. I have contemplated 73 m.p.h. only north of Crewe." It is exactly the difference between 78 and 73 m.p.h. that I do consider a meagre margin to compensate for the vastly increased severity of this portion of the route. And let it be remembered that not only is the climb of nearly 900 ft. in altitude from the neighbourhood of Carnforth to Shap Summit in question, but also the awkward grades between Moore (on the south side of Warrington)

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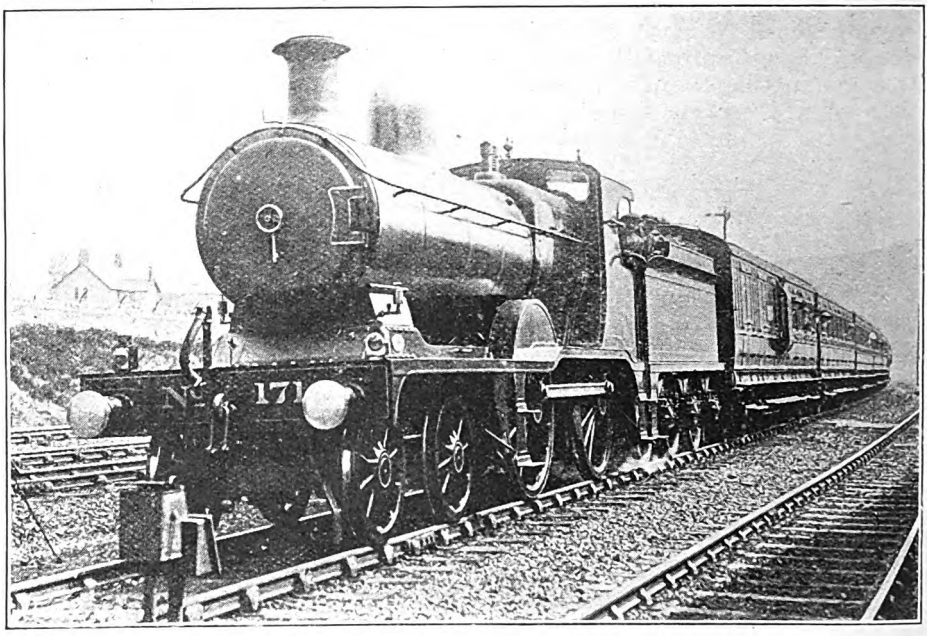

Photo.] [*W. H. C. Kelland.*

NORTH STAFFORDSHIRE AND LONDON & NORTH WESTERN RAILWAYS.

N.S.R. 4-4-0 Engine, No. 171; on through pre-war North Staffordshire Railway express from Derby, approaching Llandudno Junction.

and the north side of Preston, which would appreciably affect the average speed. In my opinion the allowance of 136 min. suggested by me for the 141 miles from Crewe to Carlisle, equivalent to 62·2 m.p.h., is the minimum practical timing with present locomotives and a 250-ton load, taking all the foregoing difficulties into account. I might remark here that Lord Monkswell's 73 m.p.h. average contemplated a 200-ton load only.

"*Making up lost time.*—In my opinion," the letter continues, "I have suggested an engine with a certain margin of power—not less than 15 per cent. I think it would amount to. But in my experience it is the rarest thing in the world for any time to be made up in Great Britain. It is almost impossible to imagine anything in a more unsatisfactory state than this question. So far as I know the railways resolutely refuse to give the drivers any definite printed instructions. With regard to the Nord, drivers' efforts are to some extent hindered by excessive Government regulations. The obsolete speed limit of 74½ m.p.h. is rigidly maintained, but within this limit time is made up to any extent, and the drivers are paid for making it up. This has frequently to be done with the boat trains. On one occasion, with a 4-4-2 and 170 tons, we passed Longneau (78¼ miles) in 68 min. from the Paris start." With Lord Monkswell's remarks concerning the practical making up of time in Great Britain I find it very difficult to agree. My experience, which I think I may by now claim to be fairly extensive, has been on the average of exactly the opposite character, as these columns have again and again borne witness. But I certainly admit that the whole question of timekeeping in this country should be placed on a more satisfactory official footing. From the point of view of the travelling public it is worse than useless to give the driver a bonus for economizing coal, unless at the same time a corresponding bonus be awarded for keeping time. Otherwise it is obvious that the temptation to drivers is to save coal at the expense of time. Were the regaining of time thus officially recognised it would become a regular practice, rather than the spasmodic effort of individual drivers, when they feel so disposed. It

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is evident from the foregoing remarks, however, that Lord Monkswell has not contemplated the systematic regaining, in his suggested schedules, of time lost by *en route* delays, whereas I have allowed what I consider a slight but reasonable margin of time for this purpose, with a corresponding reduction of the average scheduled speed.

In conclusion Lord Monkswell remarks: "My view on the whole matter is that a large acceleration would in no sense be a luxury, as is so often represented, but an economic advantage of great value. It would save a large amount of time, and time is life. I should regret to see it confined to a small number of trains for which extra fares were charged. I consider that it is applicable on all British main lines. The permanent way, signals, and rolling-stock are now adequate without alteration, and the only thing to be provided is more engine power (in the form either of more engines or of more powerful engines). A very small increase in passengers would pay for this." I am not so sure whether this is correct. If it has been necessary to reduce the speed of trains during the war in so extraordinarily drastic a degree as has been done, in order to economise in fuel and in the wear and tear of rolling-stock and track, it naturally follows that a proportionate increase of speed would add correspondingly to the cost of operation. It is also well known that the resistances to motion at high speeds increase in a geometrical rather than an arithmetical progression, so that it is highly improbable that an increase in average speeds of high-speed expresses from the pre-war figure of, say, 55 m.p.h. to one of over 70 m.p.h. would be met, or anything like met, by a "slight increase of passengers." Further, it is only reasonable that increased facilities should command an increased rate of payment from the passenger. Railways are not philanthropic institutions, but are business concerns run for profit. And as no business concern would offer commodities of varying quality for sale at a "flat" rate, there seems to me no adequate reason why railway companies should be called upon to do so.

As a kind of footnote Lord Monkswell adds: "One thing occurs to me that makes it almost certain that the results given by my calculations are not exaggerated. You will see that I calculate that the time between Crewe and Carlisle should be 125 minutes. On the last night of the race to Aberdeen this length is stated to have been covered in 126 minutes. On that occasion the weight of the engine bore almost exactly the same proportion to the gross weight of the train as in my calculations. It is reasonable to suppose that the efficiency of engines per unit of weight is greater now than then, in which case my calculations would appear to err

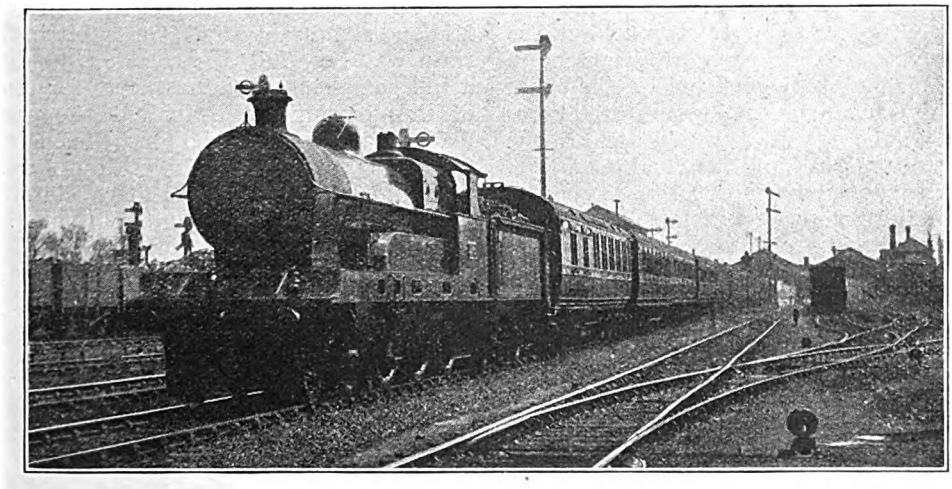

Photo.] LONDON & NORTH WESTERN RAILWAY [*Chas. S. Lake.*

1.0 p.m. down Scotch Express passing Bletchley. Four-cylinder 4-6-0 Superheater Engine, No. 1161, "Sir Robert Turnbull."

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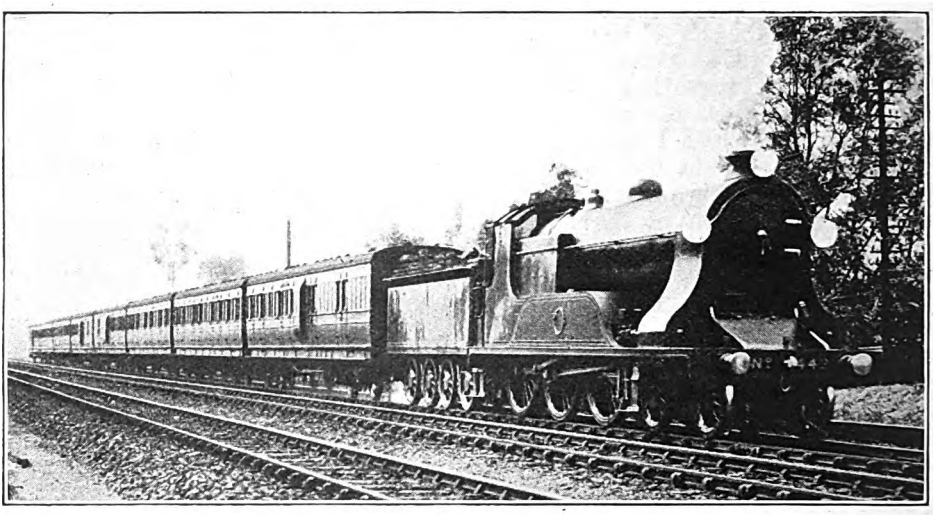

Photo.] LONDON & SOUTH WESTERN RAILWAY. [*F. E. Mackay.*

Up Bournemouth Express, hauled by 6 ft. 7 in. 4-cylinder 4-6-0, No. 443 (prior to rebuilding).

on the side of moderation." Not necessarily. It need hardly be emphasised that the 126-minute time referred to, made as it was on the last night of about the most famous railway race in history, was the result of a picked engine with a picked crew having been run at the uttermost speed of which it was capable. There is little doubt that many of the curved portions of line *en route* were taken at a dangerously high speed, as witness the accident at Preston only a short time later. Any margin of time to meet delays was non-existent, seeing that the engine was being worked "all out" throughout the journey, and no delays were experienced. This being so, I am confirmed in the belief that any curtailment of the suggested times given in the last issue would exceed the limits of practical and punctual operation.

It is now necessary for me to pass on to actual performance, so I must hold over my suggested schedules on the East Coast and other lines until the next issue. In order not to neglect entirely the present-time work of some companies whose running has been reduced to a very mediocre level by war conditions, I am now detailing some recent Midland journeys. The train concerned was the 9·35 a.m. express from St. Pancras to Manchester, which loaded on the first occasion to 52 axles or 314 tons tare, on the second to 50 axles, or 299 tons, and on the third to 44 axles or 270 tons. On the fourth occasion the load was the same, but as on my arrival at 9·25 a.m. there was not a single seat available—surely one might expect a little more accommodation a full three months after the signing of the armistice, especially on a train made up only to ten vehicles?—I sought the hospitality of Euston instead, leaving London at 11 a.m., and reaching Cottonopolis only half-an-hour later. But *revenons à nos moutons*, or rather *à notre jambon*, as the succulent sheep had not by this time become coupon-free in the Midland restaurant cars. On each trip the train was very full, the corridors holding a full complement of passengers for most of the journey; I estimated the gross loads at 350, 330 and 290 tons, the engines being respectively No. 1037, 4-4-0 compound; No. 709 superheater, class 3, 4-4-0; and No. 1039, 4-4-0 compound.

From St. Pancras we passed Hendon, 6·9 miles in 15 min., 15¼ min. and 14½ min., and reached St. Albans, 19·9 miles, in 33 min. 40 sec., 33 min. 25 sec., and 31 min. 50 sec. The level stretch from St. Albans to Luton, 10·3 miles, was run in 16½ min. on both the first and second occasions; on the third a special stop was made at Harpenden, the 4·8 miles to this point taking 8 min. 55 sec., and the 5·5 miles thence to Luton 9¼ min. Being behind time on the first journey we ran

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fairly smartly from Luton down to Bedford, passing Leagrave, 2·6 miles, in 6 min. 10 sec.; Ampthill, 11·6 miles, in 16 min.; and reaching Bedford, 19·6 miles, in 24¾ min., with a maximum speed of 65 m.p.h. on the final stage. No. 709 required 26 min. 40 sec. from Luton to Bedford, and No. 1039, 26 min. 5 sec. Out of Bedford No. 709 made the best start, passing Sharnbrook, 6·8 miles, in 11 min. 10 sec., and Wellingborough, 15·2 miles, in 22 min. 25 sec.; No. 1039 took 11 min. 25 sec. and 22 min. 50 sec., but finished up quite smartly with a time of 8 min. 20 sec. for the 6·9 miles from Wellingborough to Kettering, total 31 min. 10 sec., from Bedford, whereas No. 709 took 31 min. 35 sec. in all. No. 1037, with 350 tons, took 12 min. 10 sec. to Sharnbrook, 24 min. 20 sec. to Wellingborough, and 32 min. 50 sec. to Kettering. On the first journey the run from Kettering to Leicester was a funereal affair, as we took 15 min. 5 sec. to climb to Desborough, 6·1 miles; 21 min. 35 sec. to pass Market Harborough (where the service slack is always now enforced with great rigour) 10·9 miles; 38 min. 25 sec. to Wigston, 23·4 miles; and 43 min. 5 sec. to Leicester, 27·1 miles. No. 709 did better, passing Desborough in 12½ min., and Harborough in 18 min. 40 sec., but then ran very easily and took 41 min. 35 sec. to Leicester. Some really good running, however, was performed by No. 1037, with the 290-ton load, as we accelerated to 43 m.p.h. on the ascent from Kettering and only fell to 37½ on the final 1 in 132–122 to Desborough, which was passed in 11½ min.; we were through Harborough in 17 min. 10 sec., Wigston in 32 min. 5 sec., and should have reached Leicester in 37½ min., but for a dead stand for signals intermediately.

Out of Leicester No. 1037, now 4½ min. behind time, made a successful effort to regain the arrears, passing Loughborough, 12·5 miles, in 15¾ min., at 60 m.p.h., and reaching Derby, 29·4 miles, in 37 min. 35 sec., dead on time. No. 709 took matters more easily, passing Loughborough in 17 min. 10 sec., and taking 40 min. 40 sec. to Derby, where we arrived 1½ min. early. No. 1039 started quite brilliantly, getting through Loughborough in the "pre-war" time of 15 min. exactly, at 64½ m.p.h.; signal delays again followed, but we reached Derby in 39 min. 35 sec. Net time I should put at 36 or 37 min.; schedule is 42 min. On only two of the journeys did I proceed to Manchester, No. 1024, 4-4-0 compound, having on the first a reduced load of 36 axles, 224 tons tare and 245 tons full, while on the second the same engine had only 205 and 220 tons respectively. We passed Ambergate, 10·3 miles, in 15½ min. on each occasion, slowing there for the curve almost to a walking pace; Rowsley, 21·5 miles, in 30 and 30½ min.; while the subsequent

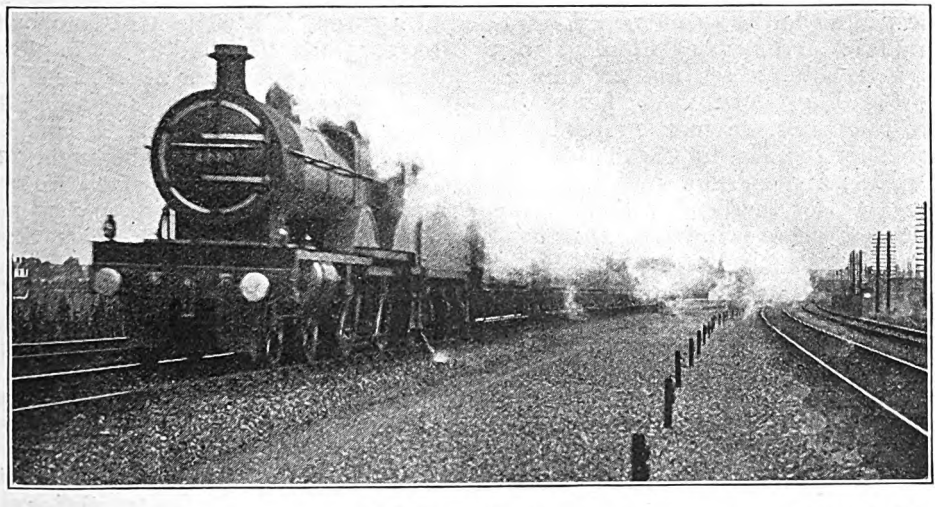

Photo.] MIDLAND RAILWAY. [*Chas. S. Lake.*

4.4.0. 3-cylinder Compound Engine, No. 1030, on up Manchester Express.

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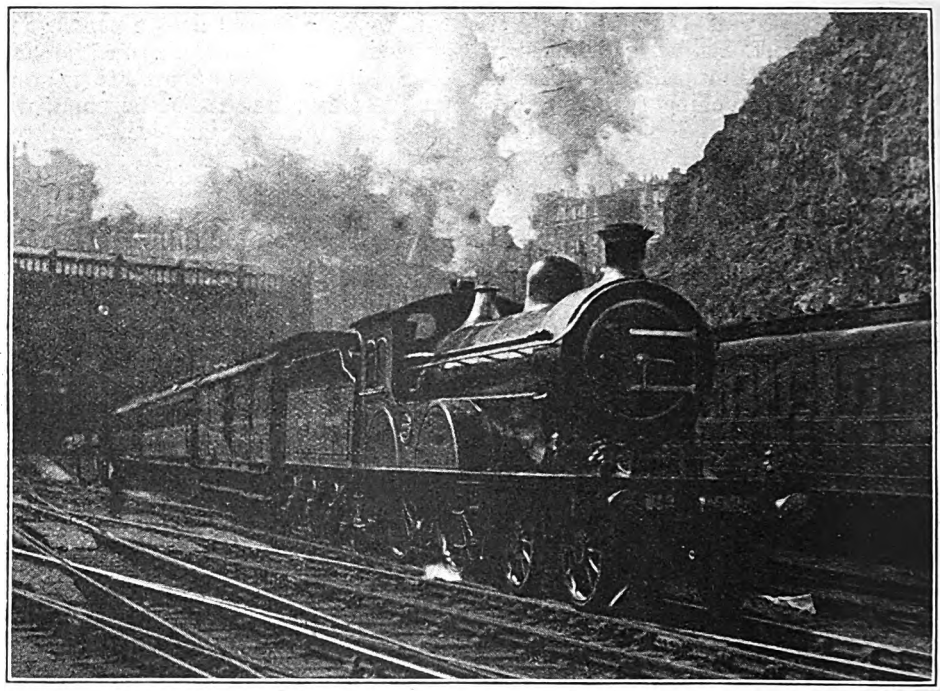

Photo.] EAST COAST ROUTE. [*W. R. Rainnie.*

4-4-0 N.E.R. Locomotive, No. 2025, on London Express leaving Waverley Station, Edinburgh.

9·8 miles ascent to Miller's Dale, mostly at 1 in 100 or thereabouts, took 17¼ min. and 19 min. respectively. Re-starting, we compassed the 4·6 miles ascent to Peak Forest, chiefly at 1 in 90, in 13 min. 10 sec. and 12 min. (the sustained speed on the 1 in 90 on the second occasion was 25 m.p.h.); and reached Chinley, 10·3 miles, in 21 min. 40 sec. and 20 min. 20 sec. Crawling down the favourable grades thereafter, we took 17 min. and 18 min. 35 sec. on to Cheadle Heath, 11·8 miles; and 15 min. 50 sec. and 14 min. 25 sec. for the 8 miles thence into Manchester, where we arrived 2½ and 1½ min. early, respectively. An analysis of the best point-to-point times out of these two runs, as well as the shortest station times, proves that we could have been in Manchester by 2·30 p.m. instead of 2·57 p.m.—on the basis of the running now current—a clear proof both of the crying need for some acceleration of present Midland times, as well as a striking refutation of Lord Monkswell's contention that time is never made up in this country.

It is interesting to compare with these runs some which I made over the same ground in the early days of the war, which have not as yet had publicity in these columns. Out of Leicester 4-4-0 engines, Nos. 759 and 747, class 3, had loads of 32 and 37 axles, totalling 215 and 245 tons full, while 4-4-0 compounds Nos. 1013 and 1017 had to tackle 38 and 37 axles, respectively, or 240 and 250 tons full. To passing Syston, 4·7 miles, the times were 7 min., 6¾ min., 8 min. and 7 min. 10 sec.; to Loughborough, 12·5 miles, 14 min. 25 sec. on the first two runs, 14 min. 55 sec. on the third, and 15 min. 35 sec. on the fourth; to Sheet Stores Junction, 20·7 miles, 23 min., 22 min. 20 sec., 24 min. and 22 min. 55 sec.; and to Derby, after slacking past Spondon, 34 min. 55 sec., 35 min. 35 sec. (33¼ min. net, as on this occasion we were badly slacked by signal at Borrowash), 35 min. 55 sec., and 33¾ min. Honours over this section rest easily with No. 747, whose net time to Derby showed a gain of 2¾ min. on the 36 min. schedule. On the fourth journey, by the way, the schedule was 37 min., so that the respective gains were 1, 2¾ (net)

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1 and 2¼ min. Loads were reduced at Derby to a more uniform figure, the engines unchanged taking forward, respectively, 32, 30, 34 and 34 axles, or 215, 205, 225 and 235 tons full. Both No. 747 and No. 1017 were badly checked before Ambergate, their times to this point being in each case 16¼ min., or 14 min. net, whereas No. 759 on the first run took 14 min. exactly, and No. 1013 on the third 13 min. 40 sec. The subsequent gradual rise to Rowsley occupied 13¾ min. (13 min. net, owing to a check just south of Rowsley station), 13 min. 50 sec., 13½ min. and 13 min. 5 sec. No. 1013 on the third run had here economised nearly 2 min. on schedule, but was afterwards checked by signal all the way to Chinley, and we continue, therefore, with runs 1, 2 and 4 only. From Rowsley up to Miller's Dale (passing) occupied 16¾ min. or 15¼ min. net., 15 min. 20 sec., and 16 min. 50 sec.; from Miller's Dale on up to Peak Forest 7¾ min., 8 min., and 8 min. 5 sec.; and from Peak Forest down to Chinley, 6 min. 35 sec., 6 min. 40 sec. and 7 min. These times total 58 min. 50 sec., 60 min. 5 sec. and 59¼ min. from Derby, 41·6 miles, or 56½, 58 and 57¼ min. net. Schedule was 58 min. From Chinley, with the most moderate of downhill speeds, we passed Cheadle Heath, 11.8 miles, in 12, 13 and 12¼ min., and reached the conditional stop at Withington, 14·7 miles, in 15½ min., 16 min. 35 sec. and 15 min. 55 sec. The final 5·0 miles into Manchester occupied 9 min. 55 sec. on each run, so that we were inside the 27 min. allowance from Chinley to Manchester on every occasion.

While in the neighbourhood of Manchester, let me mention three very creditable runs behind the fine superheater tank engines of the North Staffordshire Railway, which regularly work the heavy 12·5 p.m. express from London Road to Stoke, *en route* to Euston. On two occasions on which I travelled, the load was made up to 52 and 56 axles, weighing 363 and 407 tons empty, and 415 and 430 tons full. The load on the first journey was entirely non-corridor, and every seat was occupied. These were, therefore, very substantial trains indeed to operate with 4-4-2 tank engines, but Nos. 39 and 55, the engines concerned, came off with flying colours. From London Road to Stockport, 5¾ miles, occupied 12½ min. and 12 min.

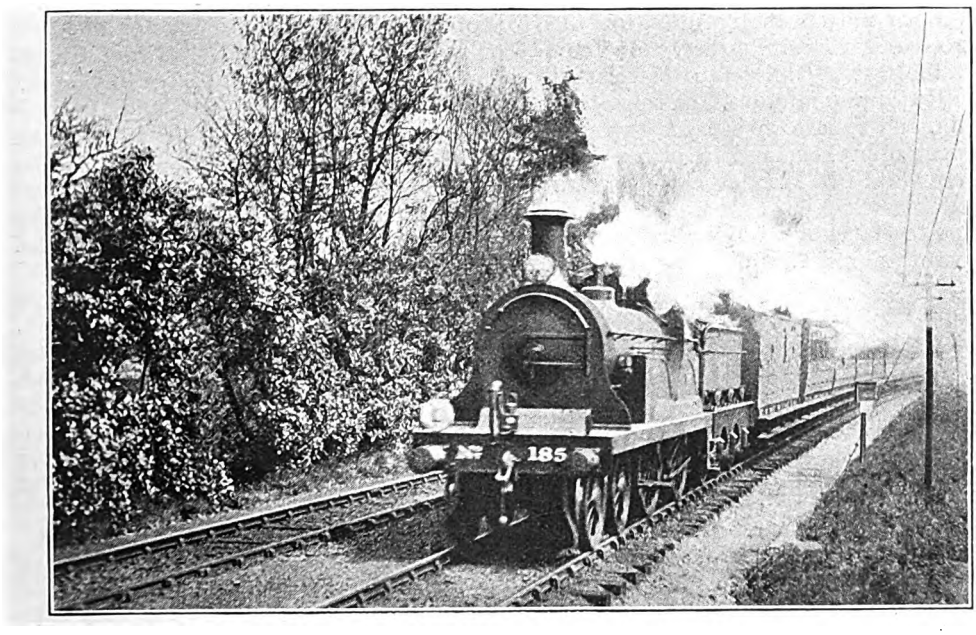

Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*P. S. A. Berridge.*

4-4-0 Engine, No. 185, hauling train load of R.M.A. troops returning from the famous fight at Zeebrugge.

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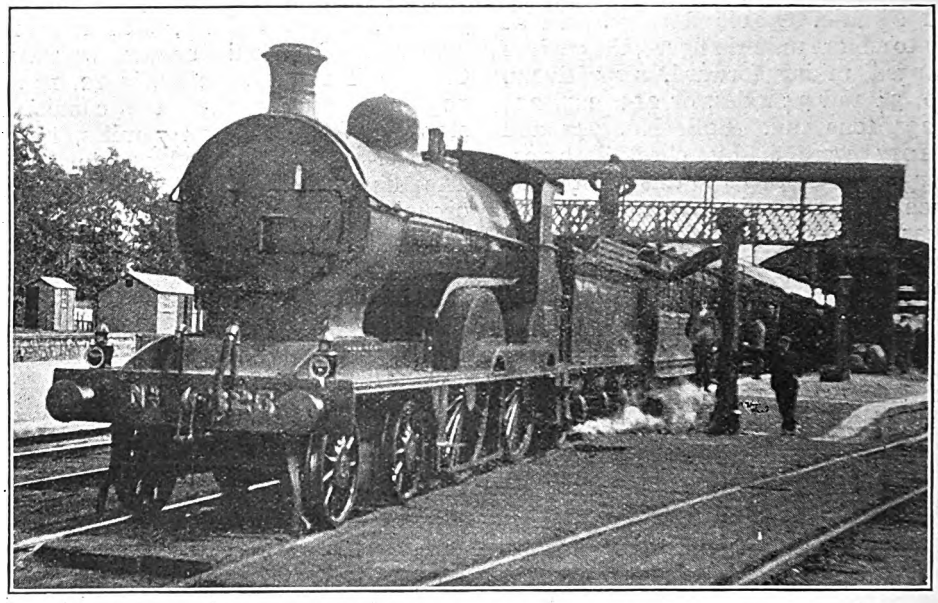

Photo.] GREAT SOUTHERN & WESTERN RAILWAY. [*K. A. C. R. Nunn.*

Boat Express train at Mallow Junction. 4-4-0 Locomotive, No. 326.

10 sec., but the latter time was equivalent to 11½ min. in virtue of a signal check at Longsight. Out of Stockport we passed Cheadle Hulme, at reduced speed, 2½ miles in 5 min. 50 sec. and 5½ min.; ran the 5 miles thence up to Adlington in 9 min. 40 sec. and 8 min. 50 sec.; and completed the last 4¼ miles into Macclesfield (Hibel Road) in 7 min. on each run—total, 22½ min. and 21 min. 20 sec. for 11¾ miles of almost unbroken, and in places steep, ascent. Out of Macclesfield we were banked in rear on each occasion up the 1 in 100 to Macclesfield Moss Box, passing that point, 2¼ miles, in 6 min. 10 sec. and 5 min. 50 sec. (on the latter occasion at 29 m.p.h.), and then ran the 6 miles to Congleton in 7 min. 40 and 25 sec., touching 57½ m.p.h. on the first run and 61½ on the second. Thence we passed Harecastle, 5¾ miles, in 9 min. 50 sec. on both runs; Longport, 9 miles, in 13 min. 55 and 50 sec.; and reached Stoke, 11¾ miles, in 18 min. 40 and 20 sec. Obviously the second was much the finer of the two runs, No. 55 having 2½ min. in all to her credit between Manchester and Stoke, whereas No. 39 was ½ min. to the bad, but in point of fact even so small a loss was creditable in view of the load hauled. I am indebted to a young friend living at Bramhall, on the route concerned, for details of a third run behind one of the large 5 ft. 6 in. 0-6-4 tanks, when the tare load (of non-corridor stock) was 360 tons, so that the gross load was probably about equal to that of the first of my own two journeys. From Stockport, Cheadle Hulme was passed in 5½ min., Adlington in 14 min. 50 sec., and Macclesfield was reached in 21 min. 55 sec. Thence the Moss Box was passed in 5¾ min., and the subsequent length to Congleton was run in 8 min. 10 sec., or at a substantially lower speed than that of the 4-4-2 tanks. Finally, from Congleton, Harecastle was passed in 9 min. 25 sec., and Longport in 13½ min., Stoke being reached in 18 min. exactly, after a slow approach. The last was therefore the only section on which the six-coupled engine showed a decided advantage. I have since enjoyed a much finer run behind No. 114 of the latter type, but must reserve details of this for the next issue.

It may now be well to continue the description of these journeys through to Euston. On the first occasion the train was still calling at Rugby, in order to attach the 2·5 p.m. from Birmingham to Euston, and we left Stoke with a load of eleven non-corridor 8-wheelers, 296 tons

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empty and not les than 340 tons full, as the train was packed. This proved too much for our non-superheated "Precursor," as we took no less than 11¾ min. to pass Stone, 6·8 miles; 14¾ min. to Colwich, 18·3 miles (here the speed was eased to 40 m.p.h. for the junction); 46½ min. to Tamworth, 35·3 miles; 63½ min. to Nuneaton, 48·3 miles; and 86 min. 40 sec. or 84 min. net to Rugby, 62·8 miles. Schedule was 79 min., and as we had left Stoke over 12 min. late, it was not surprising to find that the Birmingham portion had preceded us from Rugby. Here we changed engines, and were now taken forward by a superheater 4-4-0 of the "George the Fifth" class, whose name and number I omitted to record; we started 15¼ min. behind time. Attaining 47½ m.p.h. on the 1 in 364 to Kilsby Tunnel, we passed Welton, 7·3 miles, in 11 min. 35 sec.; and then touched 69 m.ph. before slacking to 55 through Weedon, passed in 16 min. 55 sec. from Rugby (12·9 miles). Blisworth, 19·7 miles, was passed in 24 min. 5 sec., and Roade, 22·7 miles, in 27 min. 20 sec., at a minimum of 53 m.p.h. Touching 68 m.p.h. on the descent to Castlethorpe, we were through Wolverton, 30·1 miles, in 34 min, 25 sec., and then "eased" materially, taking 41 min. to Bletchley, 35·9 miles. Speed had now fallen to 48 m.p.h. but a remarkable recovery followed to as much as 57½ m.p.h. at Cheddington; Leighton, 42·4 miles, was passed in 48 min. 25 sec., and Cheddington, 46·5 miles, in 52 min. 50 sec. Unfortunately we then got signals "on" in Tring cutting, followed by a very severe p.w.r. check right through Tring; subsequently the running was more moderate, and we had a dead stand for signals outside Willesden; consequently we took 59¼ min. to Tring, 50·9 miles; 74¼ min. to Watford, 65·1 miles; and 90 min. to Willesden platform, 77·2 miles. But our net time was only 85¼ min., and on the form displayed from Rugby to Wolverton, we could, without the slightest difficulty, have completed the journey in 80 min., or 14 min. inside schedule time, and this with a load of 340 tons. As it was, with all these delays, we regained 4 min.

The second journey was made on the re-instituted non-stop schedule of 173 min. from Stoke to Willesden, 140 miles. Our engine on this occasion was No. 964, *Bret Harte*—a 2-cylinder superheater 4-6-0 of the "Prince of Wales" class, and the load nine corridor 8-wheelers, 265 tons empty and 285 tons full. We got away from Stoke more rapidly than before, passing Stone in 10 min. 5 sec. and Colwich in 23¼ min., at 25 m.p.h. Tamworth was breasted in 43 min. 20 sec.; but we had signals on badly at Atherstone, and so took 60½ min. (or 58½ min. net) to Nuneaton. So we got through Rugby, with speed reduced to 30 m.p.h., in 77 min. 55 sec. or 76 min. net. We had left

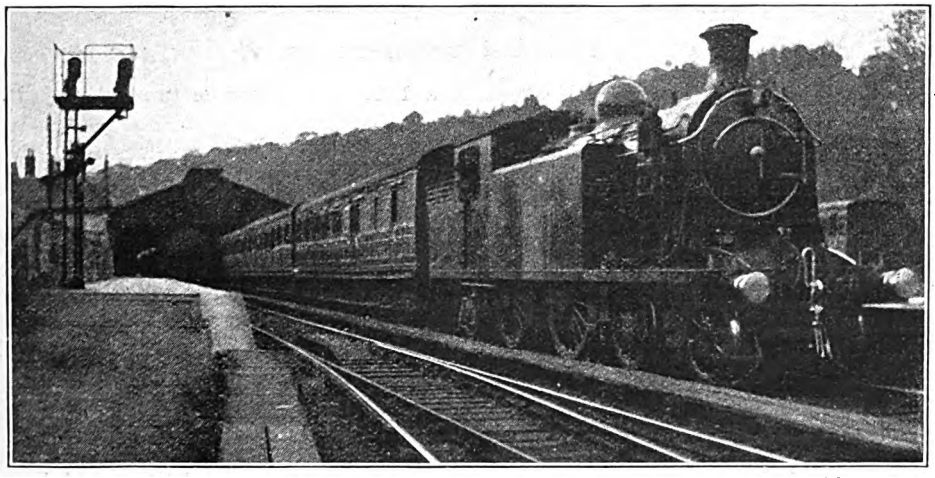

Photo.] NORTH BRITISH RAILWAY. [*W. F. Anderson.*

Edinburgh and Peebles to Galashiels train at Galashiels. 4-4-2 superheater tank engine No. 450.

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Stoke 6½ min. late, but with 88½ min. remaining for us to reach Willesden on time, the easiest of running was required. Thus we took 17 min. from Rugby to Weedon, reducing speed at the latter place to the ultra-cautious figure of 45 m.p.h., 11¾ min. thence to Roade, and 7 min. 40 sec. thence to Wolverton, total 114 min. 20 sec. from Stoke. But now unfortunately the 8·15 a.m. from Carlisle, which stops at Rugby and Bletchley, and is due in Euston at 4.15 p.m., was running over 20 min. late and was dead in front of us, checking us right through the latter station, and thence all the way to Willesden, which we reached eventually 11 min. behind time. Without these delays there is no doubt we should have regained our 6½ min. late start, which, with the 2 min. loss at Atherstone, would have made a total of 8½ min. gain to engine.

Finally, I want to mention a short but brilliant run on the Great Western Railway, of which I have lately received details from a chaplain correspondent recently returned from France, as a species of supplement to the Great Western Railway runs detailed in the last issue. The train concerned, consisting of 30 axles of non-corridor stock, or probably not over 170 tons all told, was hauled from Reading to London by a "County" class 4-4-0, of which my friend has asked me to suppress the name, as the effort concerned was made by the driver in direct response to his pressing invitation to show what the engine could do. This the driver did show in no half-hearted fashion, as he passed Twyford, 5 miles, in 6 min. 43 sec.; Maidenhead, 11·8 miles, in 12 min. 17 sec.; Slough, 17·5 miles, in 17 min. 48 sec; (after a slight signal check at Farnham Royal); West Drayton, 22·8 miles, in 22 min. 44 sec.; Southall, 26·9 miles, in 26 min. 40 sec.; Acton, 31·7 miles, in 31 min. 12 sec.; and Westbourne Park, 34·7 miles, in 34 min. 41 sec. So Paddington, 36 miles, was reached in the remarkable time of 36 min. 28 sec. My correspondent adds: "The driver said that the Farnham Royal check cost him a minute, but I hardly think it was worth more than the odd 28 seconds. After a long dose of the Chemin de Fer du Nord this was a most refreshing incident." It must indeed have been so, with its gain of nine minutes in a 36-miles' run. But it is curious, *apropos* of the discussion which has occupied the earlier part of this article, that my friend should require the refreshment afforded by British regaining of lost time in order to counterbalance experiences of the opposite character on the Northern Railway of France!

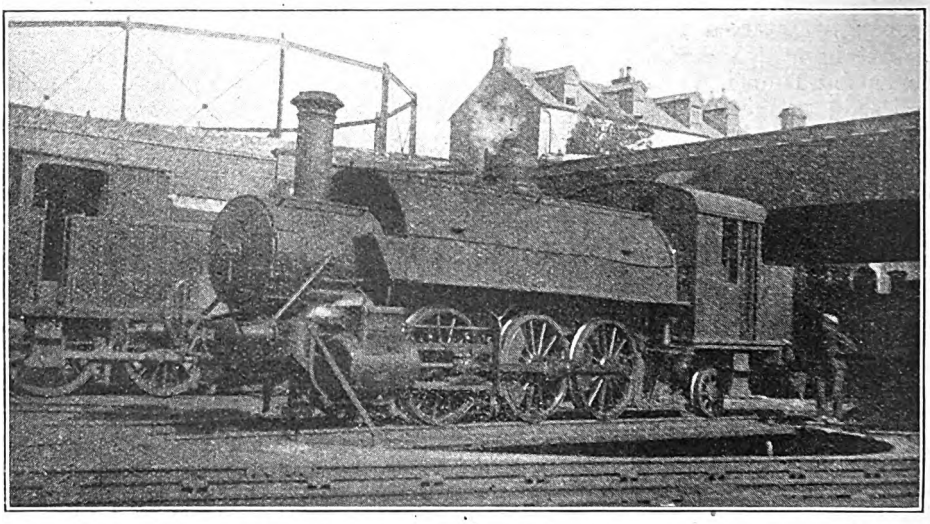

Photo.] CORK, BANDON & SOUTH COAST RAILWAY. [*K. A. C. R. Nunn.*

0-6-2 American Tank Goods Engine No. 19 (Built at Philadelphia, 1900) on turntable at Cork.

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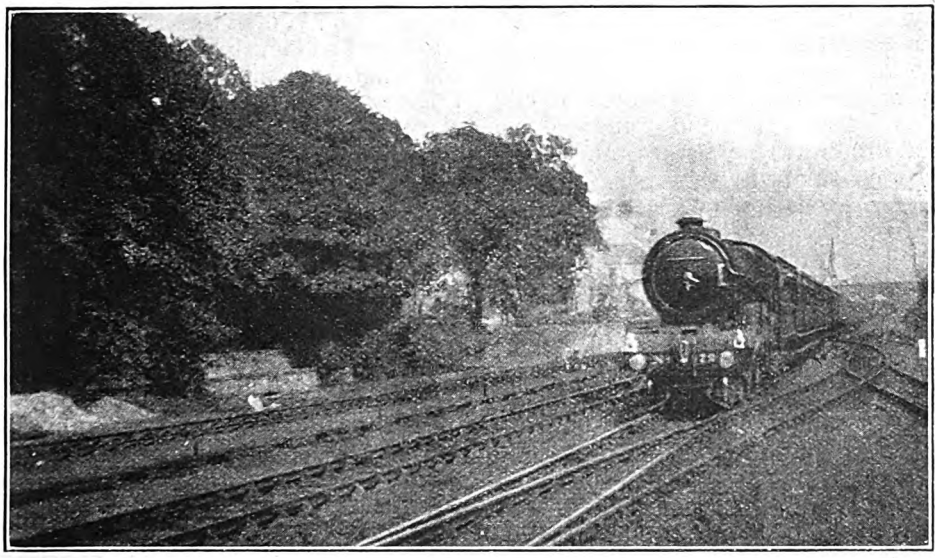

Photo.] [*A. F. Shoults.*

NORTH BRITISH RAILWAY.

Combined East Coast and Midland-North British Express passing Aberdour.
4-4-2 Locomotive No. 872, "Auld Reekie."

The Value of a Complex Railway System.

By J. F. GAIRNS.

STATEMENTS are frequently made in quarters professing to be well-informed and competent, that the British railway system is unduly complex, that it includes lines for the construction of which there is not full justification as evidenced by the existence of numerous alternative routes, and that a non-competitive policy in the past in the direction of restricting railway building on a "reserved-area" basis, as obtains in many State railway countries and to some extent in other instances, would have reduced the burden of national railway capital obligations very materially, without impairing traffic facilities as a whole. This view is a specious one, especially as it carries with it the inference that railway capital for new lines has been raised in a reckless manner, so that the present generation has to pay a price for the construction of a railway system much more elaborate and complex than available traffic demands.

Such arguments indicate inadequate realisation of the volume and character of traffic as found in the United Kingdom. Instead, it may be claimed that our complex system of railways is one of our greatest assets. On a simpler basis, no doubt, essential traffic routes would have been catered for; but development, and the opening of new sources of traffic by the cultivation of industry and trade could not have been achieved. Indeed, one of the chief difficulties in countries where railway construction is controlled and limited, is that there are so few alternative lines to relieve main routes at times of severe pressure, and that there is a tendency to concentrate national development along existing lines, while intervening areas, often of considerable extent, make relatively little progress.

The fallacy of argument on the lines suggested is that traffic dealt with by three or four routes could equally well be conveyed on two or three, the inference

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being that one at least does not fully justify itself, while the existence of this one prevents the other three being utilised to the best efficiency. Thus, a favourite claim is that because the London and North-Western, Midland and Great Central Railways all serve and cater for London—Manchester passenger traffic, while for goods conveyance the Great Northern, Great Western and Great Eastern Railways also take a hand in varying degrees, there is unnecessary multiplication of facilities, more trains are run than is economically desirable, individual loads are not adequate for operating efficiency, and that extravagant shunting, remarshalling and local trips are involved both in Manchester and in London owing to the distribution of similar traffic over so many routes. In the same way, in regard to Anglo-Scottish services, the availability of three main routes, besides several other alternatives applying in some degree, creates multiplicative working.

The weak point of all such propositions is that there is no general realisation, first, of the actual volumes of traffic to be conveyed between the great centres of population and industry; secondly, that intermediate traffic, which is not duplicative in itself, or is so in a different manner, frequently figures nearly as prominently as that from end to end, and may call for as much accommodation; and thirdly, that each route usually has associated traffic features peculiar to itself, and which would be lost were any one of the services concerned eliminated as superfluous. Examples of these phases, in passenger traffic, will explain what is meant.

Taking pre-war conditions, there were Anglo-Scottish expresses leaving Euston and King's Cross at 10 a.m. and St. Pancras at 9.30 a.m. Yet the two former, which duplicated for Edinburgh, Dundee, Perth and Aberdeen, were among the heaviest trains run even in winter—in the summer both were frequently divided—while the St. Pancras train was at least fully up to the Midland one-engine standard, though it also served stations in Scotland named, together with Glasgow, whose traffic it shared with the West Coast route. As a result each of these trains, duplicates included when run, fully justified itself from the loading point of view, not only when leaving London, but also in Scotland, for none of them were in the habit of arriving in the large Scottish cities half empty or as light trains which had shed most of their loads *en route*. Consequently, to convey the same amount of traffic would have entailed an equal number of trains.

But each of the three routes also has traffic peculiar to itself, and sacrifice of any one of the trains concerned would have reduced facilities somewhere. It may be that the East Coast train could have taken all the Edinburgh, Dundee and Aberdeen traffic from London, but the Metropolis is not the only English town supplying passengers for Scotland, so that, in default of through Midland or North Western trains, passengers from Cardiff, Bristol, Birmingham, Manchester, Liverpool, Leicester, Nottingham, Sheffield and other towns would be required to get on to the East Coast route somewhere to join the train. Similarly, if the West Coast route were confined to Glasgow, Greenock, Perth and other places, there would be corresponding limitation of facilities, passengers from many large towns being compelled to adopt indirect routes owing to the absence of direct facilities. In practice each train picked up or set down passengers at certain intermediate stations which also formed connecting points with local or other services, with the result that each one of them justified itself fully at every step, and any withdrawal would require to be compensated for by some added compensating facility. Indeed, the net result would probably be even greater total mileage, including connecting trains.

Considerations of this class apply in all cases where superficially duplicative facilities are given by various routes, each of which has its own characteristics and traffic. In fact, while war-time necessities entailed a degree of traffic classification it did not necessarily reduce train mileage, as many of the trains picked up passengers *en route* for stations to which they did not convey passengers from London, so that in the aggregate they provided substantially the full usual facilities and connections, notwithstanding that distribution of passengers be-

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tween the respective trains was controlled. So far as restriction of facilities really existed, it was in conformity with the measures adopted in national interests, and to adapt to the altered currents of traffic and the diminution in non-essential and private civilian travel.

It is, however, in regard to merchandise and mineral traffic that our complex system of railways is most valuable. Here also non-realisation of the immense tonnage conveyed is at the root of misconceptions leading to the making of statements such as those indicated in

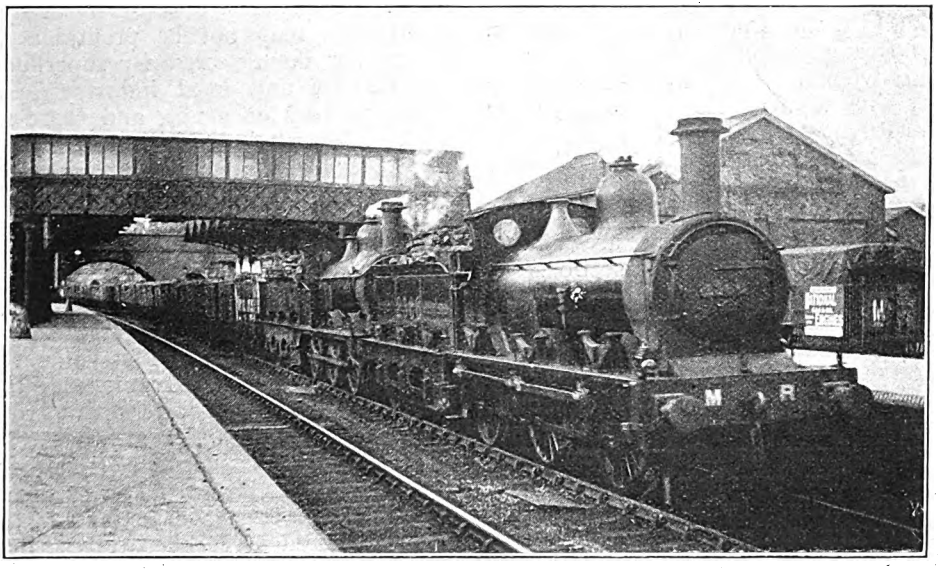

Photo.] [*F. H. Stingemore.*

MIDLAND RAILWAY.

Double-headed Coal Train passing Radlett for Child's Hill marshalling yards.
Train Engine: "Johnson" 0-6-0, No. 3610; Pilot: "Kirtley" 0-6-0, No. 2366.

introduction. Even for end-to-end journeys between large centres, every principal route is usually able to run complete trains throughout, so that in the aggregate there would be no reduction in the number of trains required to convey the total traffic. Each route has, however, traffic peculiar to itself, and, including all varieties, this involves so many trains, the majority fully loaded, that no one route could consider the concentration upon it of all traffic between, say, Manchester and London, except by transferring some of its other traffic in compensation. The only practical possibility—a method which has been largely employed during the war—is to adopt a policy of classification, all traffic between given centres being allotted to particular routes, the work as a whole being divided between the railways concerned. This is, however, a very big undertaking, for it involves the effective grouping of traffic virtually from every large town to every other large town, and even when allocated to particular routes there is the by no means inconsiderable intermediate traffic peculiar to each which must travel by the specified route. The effect is, then, not of reducing numbers of trains, but of re-grouping and re-arranging them. This policy may be advantageous for other reasons, and may in the aggregate realise a small reduction in train mileage; but is really only beneficial to meet special conditions such as those of the war period. So far as it is advantageous, some of these measures will probably be continued, though with the general resumption of trade and industry the trend and pressure of traffic will gradually enforce a return to substantially the pre-war situation. The point to

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emphasise is, however, that methods of classification and control of traffic can only incidentally or operatively economise train mileage to a small degree, while the volume of traffic remains constant.

The next question is, then, whether any of the main routes available as alternatives are not worked within a reasonable degree of their full capacity. To this the most effective answer is to point to the extensive mileage of four-track or alternative route equipment which exists within the limits of most of the leading railways. It is substantially correct to state that the London and North-Western Railway is at least four-track all the way from London to Preston. From Roade to Rugby the Northampton loop provides a traffic alternative to the direct line where it is two-track only; from Rugby to Stafford, apart from quadrupled sections of the Trent Valley line, the Birmingham and Wolverhampton loop constitutes an alternative; and onwards to Preston there are almost continuous multiple track sections or alternative routes giving the same value.

Similar remarks apply to the Midland, Great Northern, and Great Western routes from London to the North, extending at least to South Lancashire or South Yorkshire; and every one of these lines is used by heavy and frequent passenger trains, besides hundreds of goods and coal trains daily. Indeed, the suggestion that any one of these routes could take much additional traffic, even without allowing for periods of pressure, could not be considered as a practical proposition, besides which each has its own traffic and traffic-producing characteristics.

As a general proposition it may, therefore, be claimed that every main route in the country, however alternative it may be to others, has to take its share in conveying traffic not peculiar to itself, besides that which is strictly its own; so that elimination of any one route would entail a corresponding addition to the burden upon at least one other. Taking the situation on a general basis, and allowing for development, the result in most cases would at once be a demand for the construction of further loops or widenings. In addition the route eliminated involves loss of the traffic possibilities of that route, and these normally constitute in themselves one of the primary considerations justifying its construction.

On the whole, if any instances are to be found of railways which do not justify their promotion and construction, they must be sought among the secondary and branch lines, where costs are correspondingly lower than is the case with important traffic lines. In most cases if a line can be cited as unnecessary for one purpose, its construction can be supported on the ground that it has provided opportunity for local development. The fact that some of these small lines may not be profitable does not render them necessarily superfluous; the district and local industry benefit if the railway does not, and there may be substantial indirect value even to the latter. At any rate, in proportion to capital represented by the main routes, the cost of any alleged superfluous lines of the secondary class is relatively insignificant.

Apart from considerations of adequate user, necessitation by aggregate traffic totals, and individual traffic value, there are other associated advantages due to the wide range of alternative routes provided by our complex railway system. For instance, diversion of one train from the main route allows a faster or through train to get in front of it, neither of them being hindered or checked by the other, whereas otherwise, unless four-track is available, one would require to be shunted to allow the superior train to pass. Also, whether passenger or goods, they may divide traffic between places common to both routes, or give double facilities, yet each deals with its own particular traffic. Further, where alternative routes are of a main-line character it is frequently possible to divide express services so that principal stations on each benefit in regard to through long-distance facilities. And in the event of a breakdown, if an alternative is available the difficulty can be localised, all other traffic being kept moving with relatively little delay. In some instances, too, one of two alternative routes is better suited than the other for specified traffic, but not for all, so that by allocating respective classes, traffic working is facilitated and dis-

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tributed. Thus, a fairly steeply-graded line may be suitable for moderately heavy goods, fish, perishable and like trains; but big loads of minerals, may be best sent by an easier alternative, even at the expense of increased mileage. Also, one route may have longer or more convenient refuge sidings than the other.

Besides these and other aspects of the alternative-route phase of our subject, the British railway system is also complex because of the large number of possible inter-connections. Many of these, whether consisting of connecting loops or curves, or of complete sections of railway, have given rise to passenger train services of great local value, some adding very materially to the traffic facilities and convenience of the district. Take, for instance, the connection between the Kirkgate and Westgate stations at Wakefield. By running certain trains between them the whole of the local services of the Great Northern and Lancashire and Yorkshire Railways are brought into direct association. In other cases inter-connection provides effective communication between the main-line services of two or more great railways. A good example of this is afforded by the Woodford—Banbury line of the Great Central Railway. This links up with the Great Western Railway, and gave rise to a remarkable series of cross-country express trains between the two railways. Some, at least, of these trains will have to be re-introduced before very long, so valuable had they become under pre-war conditions.

Another class is the jointly-owned connecting railway. Good examples are the West London, West London Extension and North and South-West Junction Railways. Between them they connect railways north and south of the Thames in a most useful manner, and during the war were almost invaluable.

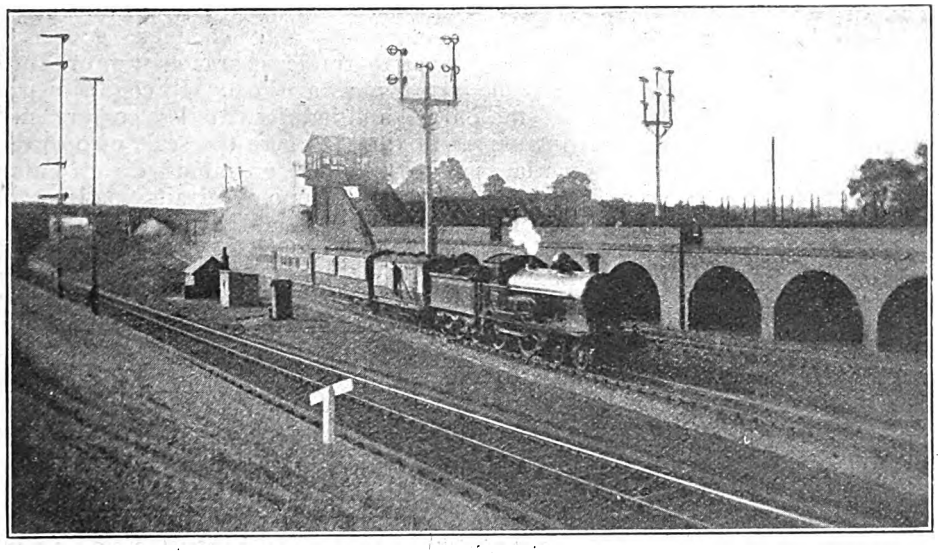

Photo.] LONDON & NORTH-WESTERN RAILWAY [*F. Thompson.*

Up Liverpool Express traversing the system of interconnecting junctions south of Rugby. 4-4-0 Locomotive No. 2495 "Basset-hound."

It is, however, for goods traffic that such connecting railways are so important. Passengers can convey themselves from one station to another, on foot, by road conveyance, or by using underground or tube railways not in physical connection with the surface lines. Luggage accompanying passengers can also be dealt with regardless of direct rail communication. But for goods traffic through rail connection is imperative if traffic is to pass beyond specified limits. A proportion is, of course, self-contained, and is confined within

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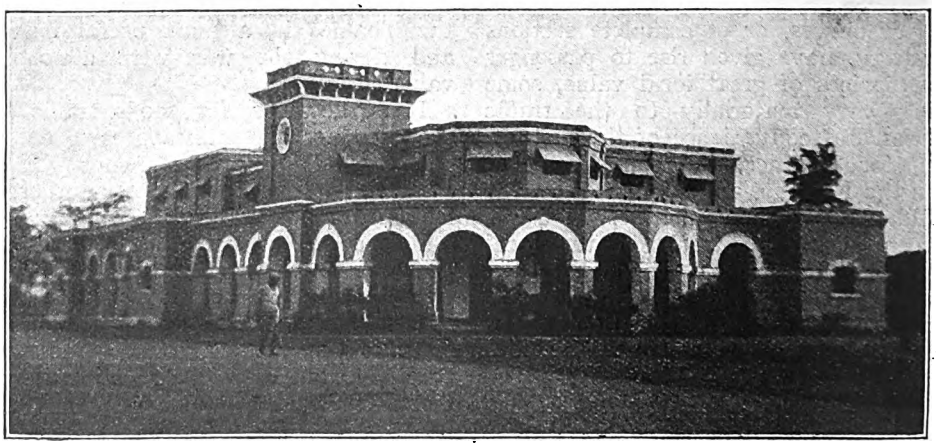
the limits of one railway; but the great feature of modern goods traffic is the enormous volume which is conveyed over routes which entail passing one or more ownership frontiers, frequently by a generous use of connecting loops, curves and inter-communication railways.

In the London area the West London, West London Extension and North and South-West Junction Railways provide effective connections between the Great Western, London and North-Western, Midland and Great Central Railways and the London and South-Western and London, Brighton and South Coast Railways south of the river; the Great Eastern, Great Northern and South-Eastern and Chatham being also served in a lesser degree. The link from the Metropolitan widened lines at Farringdon Street to the South-Eastern and Chatham at Ludgate Hill is the scene of enormous traffic between the Great Northern, Midland and South-Eastern and Chatham Railways. By means of the East London Railway the Great Eastern is connected with the London, Brighton and South Coast and South-Eastern and Chatham Railways.

Indeed, all over the country there are thousands of inter-connections between various railways, or between sections of the same railway. Many are used for interchange or through passenger services, by virtue of joint ownership, running powers or running arrangements, adding greatly to the travelling convenience of passenger facilities. But the large majority are mainly of use for goods and mineral traffic, with the result that railway wagons can be sent virtually from anywhere to anywhere, and frequently by several routes.

Even where traffic is relatively small such facilities are useful. But in all the more important instances volumes of traffic are considerable, frequently involving regular interchange services; and it would be impossible to conceive of any policy of concentration which could eliminate many (if any) such connections. In fact, they are part of the necessary equipment to meet the demands of the voluminous and complex goods and mineral traffic characteristic of British railways as a whole. In countries where trade and industry are less comprehensive and varied, where the scale of operations is more limited, or traffic is directed almost exclusively upon certain main points, less elaborate and complex railway systems may suffice. But in the United Kingdom, volume, complexity and variety of traffic and demands are associated to a degree which has no parallel elsewhere within so limited an area or to so great an extent, with the result that our complex railway system constitutes the most valuable traffic asset we possess. Far from being superfluous in any degree, further additions are continually necessary, and resumption of peace-time trade and industry, with development to meet the new conditions, will call for yet more extensions.



[*Photo.*] GREAT INDIAN PENINSULAR RAILWAY INSTITUTE AT JHANSI. [*H. J. Smith.*

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The Transport Bill.

A GIANT STRIDE IN POST-WAR RE-CONSTRUCTION.

FAR-REACHING in its possibilities, the Bill now before Parliament "for establishing a Ministry of Ways and Communications" represents much more than the redemption of promises made by the Government to the home railway companies, in view of the essentially un-economic position in which they have been placed as a corollary to use exclusively in national interests. Neither can it be regarded as merely the machinery for realising a scheme of nationalisation, though that is what in fact it will comprehend, seeing that notwithstanding provisions for leasing, working, acquisition of parts only of undertakings affected, &c., the degree of financial guarantee and Treasury assistance provided for, and the very wide powers conferred, render it virtually impossible to conceive of private enterprise remaining a large factor in the situation. Rather, then, must it be considered as a bold attempt—"A Great Adventure." *The Railway Gazette* styles it—to combine with the solution of the railway problem, means for developing, co-ordinating and improving the whole public-service transportation equipment within the United Kingdom, for national, commercial and industrial benefit to a degree that is impossible for any private concern, even without the exceptional burdens occasioned by various war-time measures.

In its scope the proposed Ministry will deal with virtually every form of internal public service transport, and the powers set forth also cover cross-Channel and like steamer services operated by railway companies, though it is not clear as to how far non-railway services of the same order, such as those of the City of Dublin Steam Packet Company, will also be involved, while the general coastal facilities—most important factors in trade and industry—appear to be outside its scope, unless the term "Inland Navigation" is to be interpreted as including sea trading between places within the United Kingdom. Furthermore, if railway cross-Channel services to European countries are included, what is the position of other trading companies, particularly those associated with, but not directly owned by railway companies, whose vessels sail between British and Continental ports?

On a general basis it appears that the design or purpose of the new Ministry is intended to embrace all the activities of British railway companies, so that no complexities can arise by including some and omitting others; and at the same time all other operating concerns are to be included, so that the whole system of public service transportation can be co-ordinated, developed, improved and unified, not with regard to financial aspects, but in national interests. There are exceptions, it is true: State dockyard ports, as their work is naturally of a special order; while municipal undertakings can only be acquired by agreement and not compulsorily. But the scope is so sweeping that it can hardly be conceived that any substantial proportion of such excepted undertakings will remain outside the scheme of co-ordination, even if they remain independent in organisation.

Inclusion of electricity supply suggests that realisation is intended of projects for the erection of super-power generating plants for supplying current for all purposes on a gigantic scale. In any event the Ministry will naturally acquire many important power stations, and a general policy of electrification of busy suburban lines will entail great extensions, so that a comprehensive scheme of large-scale installations is the outcome to be anticipated.

In view of the fact that the railway position is one of the main reasons for the Bill, it includes provisions for maintaining the present system of control and guarantee, in default of which special enactments would presumably be necessary; but in addition similar arrangements will apply to all undertakings which come within the purview of the new Ministry, the period specified—two years from the passing of

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the Act—being for "affording time for the consideration and formulation of the policy to be pursued as to the future position of undertakings to which this section applies." With this general system of control and guarantee are associated wide powers of a discretionary or developmental character, and it remains to be seen whether any essential changes, upward or downward, are contemplated in regard to "rates, fares, tolls, dues and charges." In addition there are provisions covering salaries, wages, conditions of employment; closing or opening of stations; alterations, improvements and additions; co-operation and inter-working; common-user of facilities, rolling stock and equipment, &c., substantially without reference to statutory provisions at present operative. In fact, the powers to be conferred upon the new Minister, are so wide that considerable controversy in regard to some of them, at least, is to be anticipated. At the same time, unless unreasonable exercise of such powers is to be provided against, and the laws of economics may be trusted to ensure this, while arbitrary enactments appear undesirable, it would seem that serious whittling down of any of these powers is likely to prejudice the whole purpose of the Bill. As we understand it, the powers to be conferred are intended to enable the new Ministry to act for national benefit, individually, commercially and industrially, the railway problem *per se*, however essential, being actually only incidental to it, so that wide discretionary powers are a necessity.

The scope of the Ministry of Ways and Communications includes railways; light railways; tramways; canals, waterways and inland navigation; roads, bridges and ferries, and vehicles and traffic thereon; harbours, docks and piers; and the supply of electricity. Government dockyard ports alone are exempted, in regard to which certain provisions are made. Otherwise, virtually every section of public service transport, or matters associated therewith, come within the provisions of the Bill.

It is understood that Sir Eric Geddes is to be the first "Minister of Ways and Communications." On the ground of his war-time achievements, his revealed capabilities, political independence and personal forcefulness no better choice could be offered. Indeed, it would seem that complaints in certain quarters that as a railway officer he is likely to be prejudiced in favour of railways *versus* other forms of public service transport are suggestive of "shouting before one is hurt." It is apparently forgotten that as a leading executive officer of the North Eastern Railway he has had much to do with shipping, dock and harbour, industrial and road transport matters; while suggested alternatives of a motoring or shipping expert as occupant of the position equally make possible bias in other directions, and an entirely independent minister is not in consonance with the modern "business" principle of qualified persons for positions requiring special knowledge and experience.

It is a moot question whether this Bill can be considered as directly aiming at the nationalisation of the whole transport machinery of the United Kingdom. It is set forth that at any time after the passing of the Act the Minister may be authorised to purchase by agreement or compulsorily any undertakings covered by the Bill, and enactments are included as to the terms of purchase or acquisition. But it would appear that leasing or operative control are also considered, provided that existing obligations are met and the responsibility is accepted of financing from the Treasury in respect of developmental or other aspects of "construction, maintenance and improvement" involved in carrying out the policy of the Ministry. The inference is, then, that actual nationalisation is intended, at least in regard to ownership.

Comprehensive provisions are included in regard to transfer of staff, and virtually every contingency affecting the interests of officers and servants of all grades appears to be covered on a fair and equitable basis. Also in regard to the legal position of the Minister; public rights in respect of procedure before the Railway and Canal Commission, &c.; and other aspects likely to be of vital interest to the industrial and trading community.

On the whole the Bill appears to be a laudable attempt to meet all the difficulties of the transport situation, and to co-ordinate all means of public service transportation.

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Carriage-Paid Goods Traffic.

By L. C. WEBBER REED.

PROPOSALS long since made that all railway goods train traffic should be consigned "carriage paid" still remain in abeyance, although the prejudice against them has largely broken down.

A leading railway journal recently remarked: "The reform is so desirable that we are convinced it will come. When it has been introduced we venture to predict that like the daylight saving arrangement, public opinion will marvel that it has been so long delayed." The same journal added: "A little firmness on the part of the goods managers and the Railway Executive Committee and the victory will be won."

A peaceful and beneficent "victory," simply fixing upon the consignor the responsibility for payment of carriage charges without disturbing in any way the custom as to credit accounts, which might possibly be extended.

The only objection raised in the House of Commons has been a question to the President of the Board of Trade, asking whether his attention had been drawn to a proposal that all goods train consignments should be forwarded "carriage paid," and if he was aware that in many trades prices were quoted on the basis of "carriage forward," so that adoption of the proposal would mean that articles would have to be re-costed and this would cause dislocation of business.

Recent experience nullify this argument. The rapidity with which articles have been re-costed by profiteers and the fact that an increased war wage to railway men has automatically raised the price of all commodities, shows that it is an easily subordinated difficulty.

Sixty per cent. of all goods traffic is already consigned "carriage paid," demonstrating that the principal freighters, in ever-increasing numbers, with the concurrence of their customers, prefer the arrangement. A further considerable percentage would be where the sender and consignee are the same, for instance, where firms send buyers to other towns; their trade interests would not be affected. Many other senders would, were it obligatory, consign "carriage paid" without inconvenience. A considerable number of consignments are invoiced "to pay" for no better reason than the momentary convenience of the railway staff.

Numerous cases arise where no definite arrangements are made and senders pay only if they must, the onus being thus placed on the railway companies gratuitously to adjust matters, involving much correspondence and accounting complications, often intensified by second delivery of consignments, at first refused on account of charges.

Thus we free most of the traffic from the statement that the proposed change "would cause dislocation of business." Of the remainder, a large proportion would be that of commission agents and other intermediaries, generally known as "middlemen," who prefer their traffic "carriage to pay" for entirely personal considerations, as it is to their interest to conduct their business under camouflaged conditions that most certainly should not be permitted to affect adversely this much desired and long deferred reform.

Shipping companies' traffic presents some difficulty. In the days of railway competition, the railways in return for the favour of the shipping companies' traffic, undertook to collect shipping and incidental charges on consignments handed to them. This was indeed extraordinary procedure, relieving the shipping agents of a large proportion of their accounting work, which had not even the merit of being a reciprocal arrangement, as on their side shipping companies insist upon F.O.B. conditions for all rail traffic shipped. Is the demand by the railway companies for "free on rail" for all shipping traffic railed to be withheld because it would terminate a one-sided arrangement much deplored and heavily paid for?

It must be remembered that a large

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number of retailers, as well as the general public throughout the kingdom, are affected as consignees, and obviously they desire their consignments to be "carriage paid."

The advantages of rapidity of transport should be kept in view; greatly accelerated delivery would result in speeding the release of railway wagons.

Abolition of dual abstracting is a closely co-ordinated part of this scheme. Audit office methods as applied to station accounting are cumbersome and expensive. Office work incidental to railway business is out of proportion to what should be a simple transaction. This is the settled opinion of railway officials generally outside the audit offices, where alone the suggested reform has been viewed with disfavour. My aim is to stop the waste that has been patiently endured during the plenteous days that have gone, by a remedy so simple that it is in reality merely a modernising of time-worn methods that have been in vogue unaltered for 75 years!

Some criticisms of the suggested reform, giving the figures for one of the heavy railways for the year 1916, revealed that 552,358 local and R.C.H. inaccuracy sheets were issued resulting in 400,000 futilities and 50,706 debit notes. As these figures represent approximately only one-fifteenth of the figures of the whole of the 79 controlled companies we are confronted with 6,000,000 inaccuracy sheets per annum.

What alone is material is the number of debit notes issued in respect of "carriage paid" traffic for one year with the resultant augmentation of the revenue, and I challenge the audit offices to refute the statement that their system of check is more costly than it is worth. The figures of the same heavy railway company reveal that for one year with a paid traffic of several millions the debit notes issued in respect of "carriage paid" traffic were only 1,080, a very small proportion actually augmenting the revenue. Comment is unnecessary, save that the explanation is to be found in that traffic affecting the station debit is carefully dealt with and balanced, whereas that not affecting the station debit is indifferently treated. The essentials at one station are non-essentials at the other.

The matter resolves itself into this—are the staff to be considered capable and trustworthy to conserve the companies' goods traffic revenue at its only source the forwarding stations for which they are specially trained?

The remarkable unanimity with which my suggested "carriage paid" rule has been received by my fellow railway officials, always excepting the audit office staffs, encourages me to further it by what may be considered an astounding proposal, viz., to take goods traffic accounting out of the Railway Clearing House, the same as my parcels reform scheme of 1905, which since its adoption by the Railway Executive in 1915, has effected for parcels traffic the most satisfactory results.

As already pointed out, at the forwarding stations the accounting and abstracting in respect of the forwarded goods traffic, all "carriage paid" will remain as at present, conserving every statistical need. This means that balanced summaries of all traffic carried by two or more railway companies will be rendered monthly to the audit offices for division of the receipts between the companies concerned. With the experience of many years it could be arranged for the audit offices to tabulate and apportion the earnings, independent of the Railway Clearing House, on the basis of the allocation averages of the traffic interchanged during a period of years to be determined. Such statistics are doubtless easily obtainable, and considering the immensity of the economies to be effected could be mutually agreed on for an equitable distribution of the receipts, especially as the summaries would give the actual earnings month by month and consequently would not penalise a progressive company.

The expense of the eight-hour day now conceded to railway clerks can be met by the introduction of accounting reforms eliminating wasteful office routines, which have nothing to recommend them but their antiquity.

Whether unification or nationalisation of the railways is coming, economic reforms are of paramount importance. Here is a sound beginning and who makes a beginning is said to have half his task accomplished.

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Locomotive and Train Working in the latter part of the 19th Century.

THE LONDON, BRIGHTON & SOUTH COAST RAILWAY. [No. IV.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

RETURNING once again to the locomotives, there were three types of goods engines. Of these No. 394 shows a number of goods engines of Mr. Craven's design with double frames, 5 ft. wheels and 16 in. by 24 in. cylinders, though some were 17 in. by 24 in. Several of these engines remained at work until the end of the century.

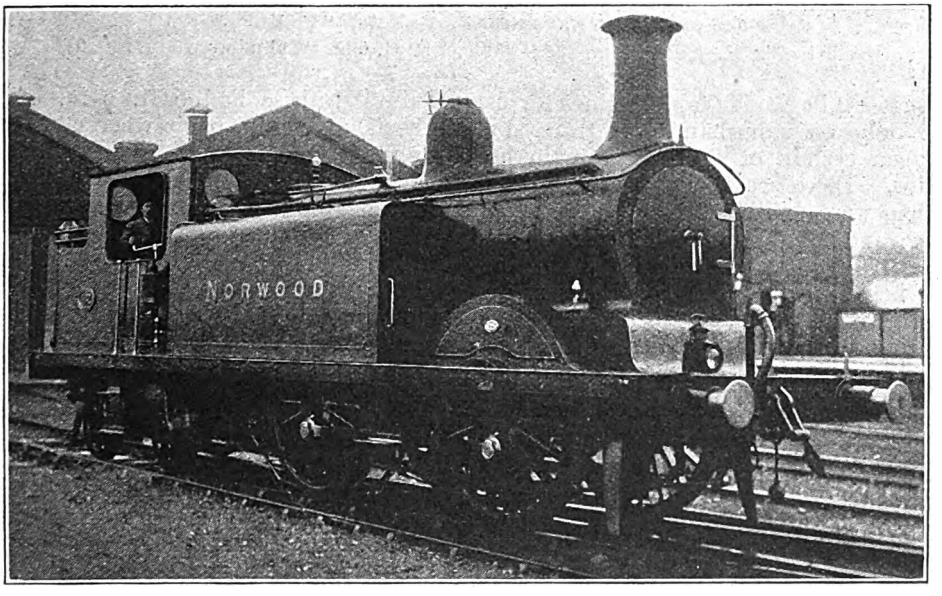

Photo.] [*Locomotive Publishing Co., Ltd.*

BOGIE PASSENGER TANK ENGINE, "NORWOOD."

Class 363-396, built by Mr. R. G. Billinton, 1892-1896. Wheels, 5 ft. 6 in. Cylinders, 18 in. by 26 in.

Mr. Stroudley's larger goods engines, had 5 ft. wheels and 18¼ in. by 26 in. cylinders, and for size and power could rank with any in England. The heavy goods engines were employed principally on the Portsmouth and Newhaven roads from London. Local goods trains were mostly worked by a large number—78 in all—of neat side tank engines of the 0-6-0 type with 4 ft. 6 in. wheels and 17 in. by 24 in. cylinders. Of these, Nos. 85 to 96 were built in 1883 and fitted with the Westinghouse brake for passenger train working. These engines and a few others of the class similarly equipped were painted the passenger engine yellow, otherwise all goods and goods tank engines were of a dark olive green colour.

The first passenger engines designed and built by Mr. R. B. Billinton, who succeeded Mr. Stroudley in 1890, were

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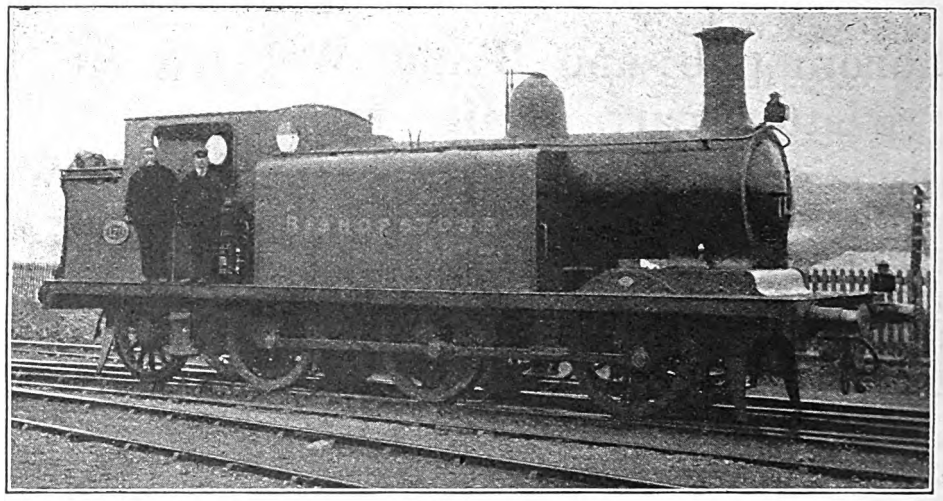

0-6-2 GOODS TANK ENGINE, No. 170, "BISHOPSTONE."
Built by Mr. R. J. Billinton, 1894. Wheels, 4 ft. 6 in. Cylinders, 18 in. by 26 in.

large 0-4-4 bogie side tank engines for use not only on suburban local trains but also on certain of the slower main line trains. There are 36 of the class, all of which were built at Brighton between 1892 and 1896, and numbered 363 to 396. The coupled wheels are 5 ft. 6 in., the bogie wheels 3 ft. in diameter, and the cylinders 18 in. by 26 in. The total heating surface is 1203½ sq. ft., and the weight in working order 48 tons 9 cwt. It will be noticed that for the first time, with the exception of Mr. Craven's old tank engine, No. 231, trailing bogies made their appearance on the Brighton company's engines.

In regard to leading bogies there had been a few sporadic attempts at them for tank engines in Mr. Craven's days. These old bogie tank engines might have been divided into two main classes, viz :— those which were continually running off the road, and those which occasionally succeeded in remaining on it. Of one of them, No. 144, Mr. A. Rosling Bennett remarked that "it had an affection for the ballast that would have done credit to a road roller." Mr. Stroudley had no liking for bogies, and did not construct a single engine of any class with one, either leading or trailing. He considered that the absence of a bogie avoided complication. In 1895, however, Mr. Billinton designed the first of the 4-4-0 bogie engines to be built for the Brighton Railway; these had 6 ft. 9 in. coupled wheels, 3 ft. 6 in. bogie wheels, 18 in. by 26 in. cylinders, and 160 lb. pressure. The boilers were of large size, having a tube heating surface of 1,227·3 sq. ft., and a firebox heating surface of 114·7 sq. ft.; total 1,342 sq. ft. The weight in working order was 42 tons 16 cwt. The following comprise the stud of these engines and their sheds :—

314	*Charles C. Macrae*	1895	P.
315	*Duncannon*	,,	,,
316	*Goldsmid*	,,	,,
317	*Gerald Loder*	1896	,,
318	*Rothschild*	,,	,,
319	*John Fowler*	,,	,,
320	*Rastrick*	,,	,,
321	*John Rennie*	,,	,,
322	*G. P. Bidder*	,,	,,
323	*William Cubitt*	,,	St.L.
324	*John Hawkshaw*	,,	P.
201	*Rosebery*	1897	,,
202	*Trevithick*	,,	B.
203	*Henry Fletcher*	,,	Nx.
204	*Telford*	,,	,,
205	*Hackworth*	,,	BN.
206	*Smeaton*	,,	B.
207	*Brunel*	,,	St.L.
171	*Nevill*	,,	BN.
208	*Abercorn*	,,	St.L.
209	*Wolfe Barry*	,,	,,
210	*Fairbairn*	,,	,,
211	*Whitworth*	,,	E.
212	*Armstrong*	1898	Nx.
213	*Bessemer*	,,	BN.

P = Portsmouth (Fratton), St.L. = St. Leonards, BN = Brighton, B = Battersea, NX = New Cross.

From the above it will be seen that 11 of these engines were sent to Portsmouth, where they displaced Mr. Stroud-

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ley's 6 ft. 6 in. singles of the "Stephenson" class, which had almost entirely monopolised the London-Portsmouth trains for fifteen years.

The last engine of the series, *Bessemer*, had a much larger boiler with a total heating surface of 1,464·8 sq. ft., towards which the fire-box contributed 110·35 sq. ft. The grate area was enlarged from 18·73 sq. ft. to 20·6 sq. ft. This engine was for some time stationed at Brighton to work the 8.45 a.m. express to London Bridge, but at a later date was removed to Battersea.

Like all Mr. Stroudley's engines, those hitherto built by Mr. R. B. Billinton had spring balance safety valves on the domes, and Mr. Billinton added a manhole cover, which served as a whistle-mounting over the fire-box, exactly as in Mr. Kirtley's old Midland practice. Round topped plain domes and lock-up safety valves were not introduced on the Brighton line until the end of 1899.

During the last decade of the century there was comparatively little attempt at providing third-class express trains. The exclusive trains, *i.e.*, those not admitting third-class passengers, remained as before, viz., three in each direction between London and Brighton conveying first-class passengers only, together with three down and four up express and fast trains for first and second class passengers. The third-class people had the additional benefit of a Saturday express, which ran from Victoria to Brighton in 70 minutes. There was also an additional Portsmouth train in each direction, and the Eastbourne service had been somewhat improved.

The following were the best runs in the period 1892 to 1896. It will be noticed that the "crack" 8.45 a.m. up from Brighton was by no means the fastest train, but it was certainly much the heaviest. The corresponding 5.0 p.m. down from London Bridge was considerably faster, though a somewhat lighter train than the former, and was booked in 64 minutes, according to the working time-table, though allowed 65 minutes in Bradshaw.

	mls.	min.	speed. m.p.h.
London Bridge to Brighton ..	50½	64	47·3
Preston Park to Croydon ..	39	50	46·8
Brighton to Croydon	40¼	52	46·5
Eastbourne to Croydon ..	55⅛	73	45·6
London B idge to Lewes ..	50	66	45·5
Fratton to Horsham	47	62	45·5
Havant to Horsham	40¾	54	45·3
Chichester to Horsham (2) ..	31½	42	45·3
London Bridge to Chichester (2)	70¾	94	45·2
Sutton to Fratton	72½	97	44·8
Croydon to Newhaven ..	46¼	62	44·8
Eastbourne to London Bridge	65¾	90	43·8
Brighton to London Bridge (2)	50½	70	43·3
Victoria to Lewes	50¼	70	43·1
Brighton to Croydon (2) ..	40¼	56	43·1
Victoria to Brighton	50¾	71	42·9
Newhaven to Croydon ..	46¼	65	42·7

Of the above, some of the runs on the Portsmouth line were very creditable, when the traffic department allowed the trains to keep time, and these trains carried third-class passengers. The Brighton trains were generally much the heaviest. But I am afraid that the merit of the above list was frequently tempered by the fact that the company's time-tables con-

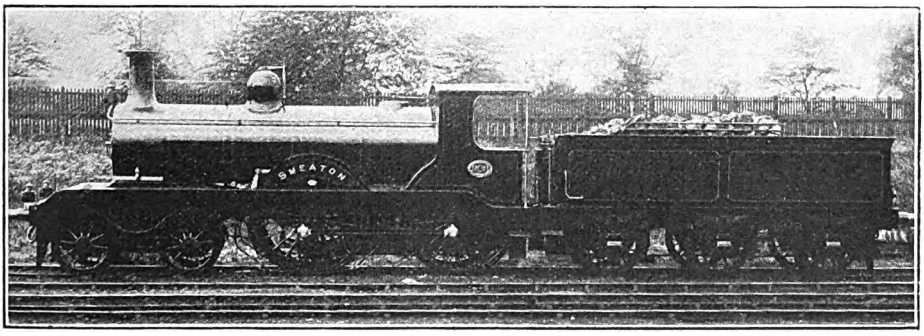

Photo.] [*Locomotive Publishing Co., Ltd.*

4-4-0 EXPRESS ENGINE, No. 206, "SMEATON."

1895 type, built by Mr. R. J. Billinton. Driving wheels, 6 ft. 9 in. Cylinders, 18 in. by 26 in.

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Photo.] [*Locomotive Publishing Co., Ltd.*

0-6-2 MIXED TRAFFIC TANK ENGINE, No. 485, "ASHINGTON."

463 class, built by Mr. R. J. Billinton. Wheels, 5 ft. diameter. Cylinders, 18 in. by 26 in.

tained many terminological inexactitudes, which the engines did their best to redress, when they got the opportunity.

It should be added to the credit of the engines on the Portsmouth line that the gradients between London Bridge and Pulborough—50 miles—are heavy, and include a large number of banks in both directions varying from 1 in 88, though mostly in short stretches, and in this connection it is worthy of remark that until Mr. Billinton's 4-4-0 coupled engines replaced them in 1896, single engines were almost exclusively employed over this road. It has been claimed that many of these banks could be "rushed," but although naturally the road is not so difficult as one on which there are long stretches of even less steep gradients, it is nevertheless a distinctly hard road, especially for single engines.

In the summer of 1898 a new express was put over to this section, and ran through from Victoria to Fratton, 86 miles, in 128 minutes. This was then the longest non-stop run on the line, but the speed was very poor, and attained only 40·6 m.p.h. running average.

For a long time it had been wondered why the Brighton Company did not run at least an occasional express to Brighton in the even hour, and at last in October, 1898, a special Sunday Pullman (first class only) express at cheaper fares was instituted. This left Victoria at 11 a.m. and reached Brighton at noon; the return train left Brighton at 9 p.m. and made the return journey also in one hour. The train was limited to six Pullman cars, and two Pullman vans, the latter principally for the electric light accumulators. The official weight of the train, including passengers, but of course exclusive of engine and tender, was given as 190 tons. On the first Sunday, October 2, the run was made by Mr. Billinton's 4-4-0 engine No. 206 *Smeaton*, and the following is the condensed record of Mr. Rous Marten's timing:—

m.	ch.			h.	m.	s.
		Victoria	dep.	11	0	0
2	58	Clapham Junction ..	pass		5	4
4	55	Balham	,,		7	59
8	57	Thornton Heath ..	,,		13	17
10	43	Croydon	,,		15	44
13	46	Purley	,,		19	39
15	33	Coulsdon	,,		22	3
20	75	Red Hill	,,		28	36
25	63	Horley	,,		32	56
29	40	Three Bridges ..	..		36	41
34	5	Balcombe	,,		41	58
38	77	Hayward's Heath ..	,,		45	31
41	53	Burgess Hill	,,		48	54
43	62	Hassocks	,,		50	58
49	41	Preston Park ..	,,		57	14
50	68	Brighton	arr.	11	59	9

Smeaton seems to have had its work cut out to accomplish the above performance, and on the following Sunday No. 213 *Bessemer*, with the larger boiler, was requisitioned, but the down run seems to have been placed in the care of the traffic department, for signal checks spoiled it.

The corresponding up journeys, both by *Smeaton* and *Bessemer*, were very

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good performances, their records being as under :—

m.	ch.			206 h.	206 m.	206 s.	213 h.	213 m.	213 s.
—		Brighton ..	dep.	9	0	0	9	0	0
1	27	Preston Park ..	pass		2	46		3	2
9	15	Burgess Hill ..	,,		12	30		12	50
12	71	Hayward's Heath	,,		16	9		16	27
21	28	Three Bridges ..	,,		26	13		26	24
25	5	Horley	,,		29	43		29	40
29	2	Earlswood ..	,,		33	40		33	52
29	73	Red Hill ..	,,		34	34		34	50
35	25	Coulsdon ..	,,		40	54		41	3
37	22	Purley	,,		42	33		42	51
40	25	Croydon ..	,,		45	14		45	30
44	17	Streatham ..	,,		49	20		49	17
48	10	Clapham Junction	,,		53	47		53	29
50	68	Victoria	arr.	9	58	32	9	57	57

The average speed of the run with 206 *Smeaton* was 52·2 and of that with 213 *Bessemer* 52·7 m.p.h. Nevertheless the extra time gained by the latter engine was entirely on the downhill portion from Croydon to Victoria. From Brighton to Three Bridges, which included the Clayton and Balcombe banks of 1 in 264, *Smeaton* made somewhat the better time. Thence down the 1 in 264 to Horley, *Bessemer* more than made up the difference, being three seconds to the good at this point, but lost it again up the succeeding rise to Red Hill, where *Bessemer* was 16 sec. behind, and this 16 sec. in favour of *Smeaton* was maintained to Croydon.

Of course people then began to consider why the company did not accelerate some of their week-day expresses, seeing that it had been conclusively proved that the thing could be done, but this sort of feeling in the atmosphere was more than the overwrought soul of that traffic department could stand, and in the following year the one hour train was suppressed, and disappeared from the time-tables, though it re-appeared again at a later period.

Mr. Billinton also put into service a large number of 0-6-2 side tank engines with 18 in. by 26 in. cylinders. The earlier engines of this type were for goods traffic and had 4 ft. 6 in. wheels, but as the class was very useful for the heavy passenger suburban trains, a very large number, Nos. 463 to 520 and 556 to 566, were built between 1897 and 1902 with larger 5 ft. wheels, and are frequently to be seen in the London local area. A subsequent class belonging, however, to the present century, has 5 ft. 6 in. wheels.

Mr. Billinton's standard goods engines, of which no fewer than 55 were constructed by the Vulcan Foundry, Limited, between 1893 and 1902, have 5 ft. wheels and 18 in. by 26 in. cylinders.

The last class of express engines of the nineteenth century were an enlargement of the previous 4-4-0 engines, the first three of which, 52 *Siemens*, 53 *Sirdar*, and 54 *Empress*, were built at Brighton between December, 1899, and February, 1900, and were followed by 30 more of the same class in 1902, 25 of which were built by Sharp, Stewart & Co., Limited, of Glasgow. These engines have 19 in. by 26 in. cylinders, 6 ft. 9 in. coupled wheels, 180 lb. pressure, and very large boilers giving a total heating surface of 1,635 sq. ft., towards which the firebox contributes 126 sq. ft. The weight in working order is 49 tons, of which 33 tons rest upon the coupled wheels.

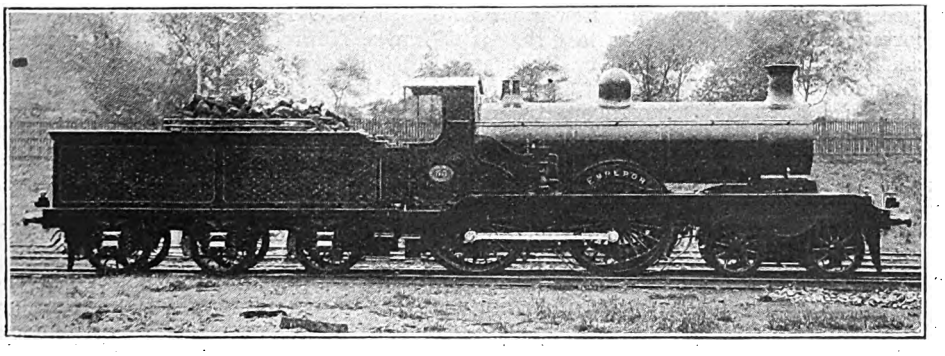

Photo.] [*Locomotive Publishing Co., Ltd.*

4-4-0 EXPRESS ENGINE No. 55, "EMPEROR."

Series 42 to 74 (1900-1902). Coupled wheels, 6 ft. 9 in. Cylinders, 19 in. by 26 in.

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In them the long-cherished spring balance safety valves on the domes disappeared, and were replaced by lock-up safety valves over the fire-boxes.

In the meantime that all-important functionary, the signalman at Red Hill, had received his *congé* in so far as Brighton main-line expresses were concerned. His little vagaries had become so pronounced that even the London Bridge authorities considered that something had to be done, so they determined to turn the flank of the South Eastern position by constructing a new loop line from Stoat's Nest Junction near South Croydon to Earlswood, a distance of just over six miles, which was opened on April 1, 1900. By this means they cut out Red Hill altogether, except that being on the higher ground they still overlook the enemy position all the way, and can still keep an eye on him. Those Brighton trains stopping at Red Hill still run over the old road. With the disappearance of the Red Hill signalman from the main line, the "Brighton" story loses so much of its picturesque interest that I cannot do better than close it.

In May Railway Magazine Mr. Ahrons will commence a series of articles dealing with the Midland Railway.

Railway Literature.

RAILWAY STORES: METHODS AND PROBLEMS. By W. H. Jarvis, F.S.S. (Great Western Railway). *The Railway Gazette*, Queen Anne's Chambers, Westminster, S.W.1. Price 4s. net, cloth bound.—There is but little of romance in the purchase, storage and handling of material, and, notwithstanding the importance of the stores department, or, rather, series of departments, on all big railways, it has to be admitted that the subject has hitherto been poorly served in regard to authoritative and practically valuable literature. Not only is an almost endless variety of materials (raw, partially finished and completed) and stores dealt with by the department, but the scale of operations is usually so great that only the best methods of store-keeping, stores-distributing and stores-accounting will suffice. The handbook is therefore all the more valuable, and its importance is evidenced by the fact that it earned for the author a Rosebery Prize at the London School of Economics and Political Science. It is not concerned with any one particular system of storekeeping; but it deals with the principal aspects, whether considered together or divided between general, permanent way, locomotive and other departmental stores. The first chapter considers the Chief Stores Officer; should he be an engineer or a commercial man? and the desirability or otherwise of having both a storekeeper and a purchasing agent. Other chapters deal with the organisation of the stores department; purchase, inspection and sale of materials; storage and distribution, and stores accounts. Each is considered very carefully, and the book can be cordially recommended on account of its thoroughness and its thoughtful treatment of each section and sub-section. A very full index is a valuable conclusion.

LOADS ON HIGHWAY BRIDGES. Messrs. E. and F. N. Spon, Limited. Price 2s. 6d. net (post free in the United Kingdom, 2s. 8d.). —This booklet is a report of a Joint Committee appointed by the Concrete Institute, the Institution of Municipal and County Engineers, and the Institution of Municipal Engineers, with appendices by H. Adams and H. Kempton Dyson. It is based upon data supplied by County, City and Borough Engineers, Railway Engineers and others, and supplies a fund of useful technical information.

GREAT WESTERN RAILWAY ENGINES: Names, Numbers, Types and Classes. New Edition, 1919. Copies may be obtained from the offices of the RAILWAY MAGAZINE, 30, Fetter Lane, London E.C.4. Price, 1s.; post free in the United Kingdom, 1s. 1½d.

THE LOCOMOTIVES OF THE RAILWAYS OF THE ISLE OF WIGHT. Compiled and Published by P. C. Walker, 11, Candler Street, Stamford Hill, London, N15. Price 1s. This eight-paged pamphlet will appeal to those who are interested in the locomotives belonging to the three railways serving the Isle of Wight. Full dimensions of all classes are set forth. Particulars of each engine includes date of construction. Information is provided concerning the locomotives purchased from other railways.

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The Why and the Wherefore.

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which will be published early in April, 1919, price 5s. net, by post 5s. 6d. Every reader who desires a copy should order at once. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use.*

South-Eastern and Chatham Railway Trains north of the Thames.

Prior to 1907 both sections of the South Eastern and Chatham Railway provided through trains, *via* Ludgate Hill and Farringdon Street, to and from the Great Northern and Midland Railways. In the case of the London, Chatham and Dover section through services between these railways and Victoria were divided, so that while Great Northern and Midland engines and rolling stock worked to Victoria, London, Chatham and Dover trains worked to Finsbury Park, Kentish Town and suburban termini beyond. Great Northern services were withdrawn October 1st, 1907; and Midland services July 1st, 1908. There were South-Eastern trains running *via* Farringdon Street, Ludgate Hill and the connecting line to London Bridge. These were somewhat infrequent and irregularly arranged. They ran only to the Great Northern Railway on the north side of the river, with varied termini, including most of the Great Northern local routes, each once or twice daily. On the south side they were similarly varied, serving most of the local routes. They were withdrawn April 30th, 1907. The line from Snow Hill towards Aldersgate Street joins the Metropolitan Widened lines at Smithfield Box in the tunnels there.

[Reply to A. E. R.]

Superheater Engines.

There is no infallible rule for recognising superheater engines by their external appearance, but the following indications may serve as a guide: snifting valves above the smokebox behind the chimney on the Great Northern Railway, Great Eastern Railway, and latest types on the Caledonian Railway; snifting valves projecting at the base of the smokebox on either side, in appearance like large pepper-pots, on the North-British Railway and earlier-type Caledonian Railway engines; extended smokeboxes on the North Eastern Railway, London and North-Western Railway and London and South-Western Railway; pyrometer connection projecting from left-hand side of smokebox on the Great Central Railway; small damper cylinder and lever on left-hand side of smokebox on the Midland Railway; on the London, Brighton and South-Coast Railway and Great Western Railway recognition is more difficult, but all the modern types of both those companies are superheater equipped.

[Reply to "ENQUIRER."]

Pullman Cars on South-Eastern and Chatham Railway.

Names of Pullman cars working on this railway are:—

Florence.	Alicante.
Savona.	Leghorn.
Sorrento.	Seville.
Valencia.	Ruby.
Clementina.	Mimosa.
Emerald.	Daphne.
Regina.	Topaz.
Sapphire.	Hawthorn.
Palermo.	*Hibernia.
Shamrock.	*Orpheus.
Cosmo Bonsor.	*Glencoe.
Corunna.	*Scotia.

These will shortly be supplemented by 15 others to cope with the ever increasing

* Twelve wheelers, all others are eight wheelers.

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continental traffic on this line. The several correspondents who state they have seen Pullman car "Galatea" working on this railway have evidently mistaken the "Glencoe" for it. The "Galatea" we are officially assured has never worked off the Metropolitan Railway.

[Reply to R. M. PATON and others.]

Recent North Eastern Railway Locomotives.

Latest locomotives added to the North Eastern Railway stock have been as follows:—2143-2162, 4-4-4 three-cylinder superheater tanks, Class D: 2163-2172, 4-4-2 three-cylinder superheater express passenger, Class Z; 2173-2192, 0-6-0 shunting tanks, Class E1; 2193-2212, 4-4-2 three-cylinder superheater express passenger, Class Z; 2213-2242, 0-8-0 superheater mineral, Class T2. The 2-8-0 three-cylinder tank engines specially employed in marshalling yards were the first three-cylinder engines built for the North Eastern Railway, and have three cylinders 18 in. dia. by 26 in. stroke. They weigh 84¾ tons in working order and are classed as "X." We have not the necessary space to give you the shed details you require.

[Reply to J. APPLETON.]

Train Working of Locomotives.

It is impossible to say definitely that any particular engine is regularly working certain trains. It may do so for a period; but by the time an answer given in these pages is published the working may have been changed. *The Great Bear*, while taking a share in heavy goods working, ranks as an express passenger engine, and generally works between London and Bristol so that may be seen at Paddington, though on various trains. 4-6-4 tank engines Nos. 327 and 328, London, Brighton and South Coast Railway are regular visitors to Victoria station, more often working on Portsmouth line trains.

[Reply to G. A. T. PRITCHARD.]

Railway Year Book.

The twenty-second annual edition, *viz.*, that for the year 1919, will be published early in April, as advertised. If the Transport Bill now before Parliament passes, the railway affairs of Great Britain will be so altered that possibly this may be the last issue of the book in its present form. In such a case the historical value of the *Railway Year Book*, 1919, will be greatly enhanced, and there is sure to be an exceptional demand for it on this score, quite independently of its merits as the standard railway reference work. The moral is, order early and secure your copy.

[Reply to EDWIN C. JANES and others.]

0-6-2 *v.* 4-4-2 Tank Engines on the Great Northern Railway.

We cannot say that we have noticed the greater slipping propensities of the six-coupled as compared with the four-coupled tank engines on the Great Northern Railway; in fact, our own experience is rather of the opposite order. The liability of an engine to slip is governed by various factors, such as the extent to which sand is employed, or to which the regulator is opened on starting, and is therefore largely a matter of individual driving, irrespective of the type of engine concerned. Your other query transgresses the rules at the head of these columns.

[Reply to W. S. UPTON.]

Caledonian Railway 4-6-0 Locomotive.

So far from being only three, there are six distinct classes of 4-6-0 engines on the Caledonian Railway, *viz.*, the 6-ft. 6 in. express engines (No. 49, 50, and 903-906); the new 6 ft. 1 in. Pickersgill express engines of the "60" series; the 6 ft. engines (No. 938-943) purchased from the Highland Railway; the 5 ft. 9 in. "mixed traffics," of which Nos. 179-188 are superheated and Nos. 908-917 are not; the 5 ft. express goods engines (Nos. 918-922); and the 5 ft. 4-6-0's specially built to work the Callander and Oban line, numbered from 51 to 59.

[Reply to W. L. K.]

4-6-0 Locomotives.

Our reply to V. McCurdy in the March issue distinctly states that certain lines were still building 4-6-0 engines, so that the total numbers given were in course of increase. We note, however, that the Caledonian total is now 53 instead of 51, and the Highland 38 instead of 34, and may add that the London and South-Western Railway has now turned out two more (total four) of the "736" class.

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making a total of 40 instead of 38. The grand total of 4-6-0 engines is thereby increased to 875, as against 293 "Atlantics."

[Reply to D. L. THOMSON.]

South-Eastern and Chatham Railway Locomotive No. 686.

This engine was designed by Mr. H. S. Wainwright and built in 1901 by Sharp, Stewart & Co. It is of the then standard 0-6-0 series, class "C." In 1913, it was fitted experimentally with apparatus for conveying smoke box ashes to the firebox for reburning, thus saving fuel and at the same time clearing the smokebox. The extended smokebox was fitted to accommodate the special equipment; but while the latter has been removed, the extended smokebox has been allowed to remain.

[Reply to W. E. SYDAL.]

Cockermouth, Keswick and Penrith Railway.

Reference to the "Railway Year Book" will show you that this is an independent company, of which two large shareholders are the London and North-Western and North Eastern Railways, each of whom nominates two directors to the Cockermouth, Keswick and Penrith Board. Passenger and goods traffic is operated by the London and North-Western Railway, and mineral traffic by the North Eastern Railway, each of these companies finding the requisite rolling-stock for this purpose.

[Reply to T. C. ORFORD.]

"Orestes" and "Europa."

It was in 1854 that the London, Brighton and South Coast Railway purchased from the Manchester, Sheffield and Lincolnshire Railway the two heavy goods engines bearing the above names. They were numbered 171 and 121 respectively. Built by Messrs. Sharp, Stewart & Co. for their original owners, they were found too powerful for the work required of them and they were sold to the Brighton Railway. On the latter line they were used to haul heavy ballast trains.

[Reply to ARTHUR FOX.]

Some Great Northern Railway Queries.

Between Loversall Carr and Balby Junction (Doncaster) the signal-boxes are named as follows, from south to north: Loversall Carr, Black Carr Junction, Childer's Drain, Potteric Carr, Decoy No. 1, Decoy No. 2, Red Bank and Balby Junction. Woodwalton Bank extends from mile-post 62¾ to mile-post 67¼, it is adverse for up trains. Cadwell Box is adjacent to the 33¼ mile-post, and marks the commencement of the steeper portion of the up-grade from Arlesey to Stevenage.

[Reply to "KING'S CROSS."]

443 4-6-0 Class, London and South-Western Railway.

There are no compound engines on the London and South-Western Railway, the 4-cylinder 4-6-0 engines to which you refer having four simple cylinders of equal size. The 443 class, with 6 ft. 7 in. wheels, have Walschaert valve-gear to the outside cylinders, the valves of the inside cylinders being operated by rocking shafts from the outside motion. Boilers of these engines are 4 ft. 9½ in. diameter, or 5 ft. 3¼ in. outside the lagging.

[Reply to "COMPOUND."]

"Rebuilt" Engines on the Great Eastern Railway.

The word "Rebuilt" on the number-plates of Great Eastern Railway locomotives is frequently used to denote that they have been supplied with new boilers merely, without any alteration of type or design; this is so in the case of 2-4-2 tank engines Nos. 1086 and 1089, to which you refer. As regards your second query, see reply to E. S. Coombs, on page 271 of last October RAILWAY MAGAZINE, under the heading "Snifting Valves."

[Reply to "G. E. TANK."]

South-Eastern and Chatham Railway Mileages.

Our reply in last month's issue as to the difference in mileages from Victoria and Charing Cross to points on the old South-Eastern and London, Chatham and Dover main lines respectively, *via* the Bickley connections, was taken from the figures given on the Railway Clearing House map. We are informed by Mr. G. W. T. Daniel, however, that these are *mean* distances.

[Further reply to "AIRFORCE."]

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Manchester Railway Stations.

The original station of the Liverpool and Manchester Railway was located approximately where Oxford Road station now stands. The Midland route to Manchester was opened for passenger traffic February, 1867, London Road station being first used. Trains ran from near Buxton to New Mills, thence adopting the then Manchester, Sheffield and Lincolnshire Railway's lines.

[Reply to "MANCUNIAN."]

Head Codes.

Standard head codes indicating traffic classification of trains generally apply all over respective systems. Where special codes are in use they usually indicate route and destination of train. In various districts the same codes may be employed for different purposes, as long as they do not come together at any point. Otherwise head codes have no district application.

[Reply to W. F. HORDER.]

Wivelsfield Accident, London, Brighton and South Coast Railway.

It was on December 23, 1899, that this accident occurred, not in 1897 as you state. In a dense fog the 5.45 p.m. up Pullman express from Brighton ran into the rear of the 5.35 p.m. boat express from Newhaven. The engine of the former train was therefore the only one concerned in the disaster; it was of the 4-4-0 type, No. 206, *Smeaton*.

[Reply to "FRONT END."]

Glasgow and South-Western Railway Carlisle-Glasgow Expresses.

Of the two locomotive types you mention the 4-6-0 engines are more suitable than the large 4-4-0's for working the Midland and Glasgow South-Western expresses north of Carlisle, as their driving wheels are of larger diameter—6 ft. 6 in. as against 6 ft.—and their 8-wheeled tenders are of suitably large fuel and water capacity.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Great Western Railway Boilers.

In the standard domeless boilers of the Great Western Railway, steam is collected in a perforated pipe, not running the length of the boiler as you state, but placed transversely across the top front corner of the firebox. The exit from this pipe to the steam-pipe, which runs the length of the boiler, is closed by the regulator.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Westinghouse-Fitted Locomotives, Midland Railway.

All the tank engines taken over by the Midland from the London, Tilbury and Southend Railway are fitted with the Westinghouse brake, *i.e.*, Nos. 2100–2107, 4-6-4 type; 2110–2179, 4-4-2 type; and 2180–2193, 0-6-2 type; together with six engines of the Midland 0-6-4 tank type, which were for a time used on the Tilbury section.

[Reply to "DERBY."]

Railways of Military Importance.

Notwithstanding the enormous military traffic carried over other lines during the war the most important British line from a military point of view is the London and South Western Railway. It has more military stations on it than any other line. It likewise connects the three great naval stations, Portsmouth, Portland and Plymouth.

[Reply to AUSTIN KEYES.]

Record Runs on the Great Eastern Railway.

There are records extant of "Claud Hamilton" class 4-4-0 engines having covered the 51¾ miles from Colchester (passing) to Liverpool Street in 58 min., with the heavy "Norfolk Coast Express" of pre-war days. Schedule time was 61 min. We have no details of the fastest start-to-stop record between these points.

[Reply to H. E. BASKERVILLE.]

Fastest Train on the Great Western Railway.

The fastest pre-war train was the 11.5 a.m. from Paddington, booked in 120 min. for the 118½ miles to Bristol *via* Bath. The "Bath Spa" slip was booked publicly to arrive in 108 min., 106⅞ miles; but the express was scheduled to pass in 105 min. thus averaging over the mile-a-minute rate.

[Reply to T. E. BEAMES.]

Level Crossing Gates.

Running through railway level-crossing gates is not altogether an infrequent railway casualty, and we are quite unable

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to state the circumstances of the accident to which you refer from the scanty clues given in your query. Your other question is apparently based on some misunderstanding.

[Reply to "CHUM."]

London and South-Western Railway Engine Head-Codes.

Head-codes and lamps employed on the London and South-Western Railway indicate the routes to be followed by the trains, and not the character of the trains themselves. We have not space to give you a list of the different codes in use. See illustrated article in RAILWAY MAGAZINE, March, 1918.

[Reply to W. F. HORDER.]

Blowing off Steam.

That the boilers generally in use on the Great Western Railway are pressed to a much higher figure than those of the Great Northern is probably sufficient to account for the greater prevalence of "blowing off" on the latter than on the former.

[Reply to "SURBITONIAN."]

Some Great Central Railway Locomotive Queries.

All the "Atlantic" locomotives of this company are finished in the customary green livery. Several of them have now been equipped with the Robinson superheater. At present there is only one locomotive of the *Lord Faringdon* four-cylinder 4-6-0 class.

[Reply to T. BRIDGE and C. L. B.]

North Eastern Railway Records.

We have no information as to the highest authenticated speed reached on the North Eastern Railway. The highest speed recorded in this periodical was one of 85 m.p.h. on Micklefield Bank, with the 5.13 p.m. non-stop summer express from Leeds to Scarborough.

[Reply to H. THOMPSON.]

Compound Locomotives.

Locomotive compounding gives the most satisfactory results in the case of engines under continuous steam, *i.e.*, express passenger and main-line goods locomotives, and it is to such types that the principle has, up to the present, mainly been applied.

[Reply to G. S. and W. R]

Brake Motors on Electric Trains.

Presumably you refer to the operation of the motors running the air compressors for the Westinghouse brake. These are placed under motor coaches, and naturally start working after each stop, whether at stations or intermediately for signals, to restore the pressure.

[Reply to "HAMPSTEAD LINE."]

Ringwood, Christchurch and Bournemouth Railway.

The line from Ringwood to Christchurch was opened November 13, 1862. The extension Christchurch to Bournemouth came into use March 14, 1870. From January 1, 1874, the line was amalgamated with the London and South-Western Railway.

[Reply to THOS. K. HEADLEY.]

Caledonian Railway Widenings.

Under a special arrangement with the Government part of the main line to Carlisle, between Rockcliffe and Floriston stations, is being widened for a length of nearly two miles. Glasgow and South-Western Railway trains traverse this section by virtue of running powers.

[Reply to J. G. I.]

Stoat's Nest Accident.

This occurred on January 29, 1910, the express being derailed behind the station now known as Coulsdon and Smitham Downs owing to the shifting of a wheel upon its axle. The train was the 3.40 p.m. up from Brighton.

[Reply to T. E. BEAMES.]

Sand Boxes for Locomotives.

On many railways it is the practice to combine the sand boxes with one of the coupled wheel splashers Both the illustrations you refer to, on pages 12 and 13 of the January RAILWAY MAGAZINE include this feature.

[Reply to C. FORDER.]

Midland 0-6-4 Tank Engines.

These locomotives work most of the Midland local trains in the Birmingham district, and therefore take their turns

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on lighter trains such as those you mention, as well as the heavier ones for which they are most suitable.

[Reply to A. COCKING.]

4-4-0 No. 398 London and South-Western Railway.

This engine is one of a series designed by the late Mr. Dugald Drummond for service on the Portsmouth route. They preceded the 415 class, and have coupled wheels only 6 ft. diam. They are now mainly used west of Exeter.

[Reply to C. L. B.]

Corridor Stock, London, Brighton and South Coast Railway.

A number of corridor coaches are in use, and the 5 p.m. London Bridge–Brighton express is, we believe, vestibular. On the "Southern Belle" the Pullman cars are vestibular.

[Reply to C. THOMPSON.]

Lighting of Railway Signals.

Oil is still most general for railway signal lamps. Gas is frequently used, but not always, where available. Electric light is not usual, except for automatic and power plants.

[Reply to H. G. MARR.]

Box Tunnel, Great Western Railway.

Length is 3,212 yards, and section is semi-elliptical. A portion is well over 300 ft. deep, and there are 13 ventilating shafts. The tunnel was completed in 1841, construction occupying 2½ years.

[Reply to T. E. BEAMES.]

4-6-0 Locomotives, London and South-Western Railway.

We believe that the new "736" class two-cylinder 4-6-0 engines of this railway are performing very satisfactory work. We have no information in regard to your second query.

[Reply to "SURBITONIAN."]

North Eastern Railway "Atlantic" Type Engines.

See reply to "M. H." on page 405 of the December, 1918, issue, in which the information you require was given in detail. We cannot afford the space to give the sheds of these engines.

[Reply to A. DICKINSON.]

Caledonian Railway Gradients.

Gradient out of Buchanan Street Station, Glasgow, is 1 in 79 for 1¼ miles, 1 in 98 for 1⅛ miles, 1 in 125 for ⅝ mile, and a final ¼ mile at 1 in 208 to Robroyston station; total 3¼ miles.

[Reply to JOHN W. SMITH.]

"Claughton" Class Locomotives, London and North-Western Railway.

Sixty engines of this type (4-cylinder, 4-6-0 express passenger) have now been built and are at work on the London and North-Western Railway.

[Reply to J. B. HEAP and J. W. HOAR.]

2-6-4 Tank Locomotive, South-Eastern and Chatham Railway.

There is only one engine of this type at present on the South-Eastern and Chatham Railway—No. 790—and this is stationed at Ashford.

[Reply to J. B. HEAP and J. W. HOAR.]

South-Eastern and Chatham Locomotives.

Superheater 4-4-0 engines of the series including No. 771 are known as Class "L." The 0-6-4 superheater tank engines are Class "J."

[Reply to "FLYING FOX."]

Glenfield Tunnel.

Glenfield Tunnel, Midland Railway, is 1 mile and 36 yds. in length. It was opened July 17, 1832.

[Reply to ARTHUR J. AMOS.]

The Forth Bridge.

The structure was completed and opened on March 4, 1890.

[Reply to G. N. BELL.]

Sturrock's Steam Tenders.

See reply to J. P. Brierley in RAILWAY MAGAZINE, November, 1917, page 341.

[Reply to J. R. WHITAKER.]

Locomotive Dimensions.

See reply under this heading in the last issue.

[Reply to E. V. ARDRON.]

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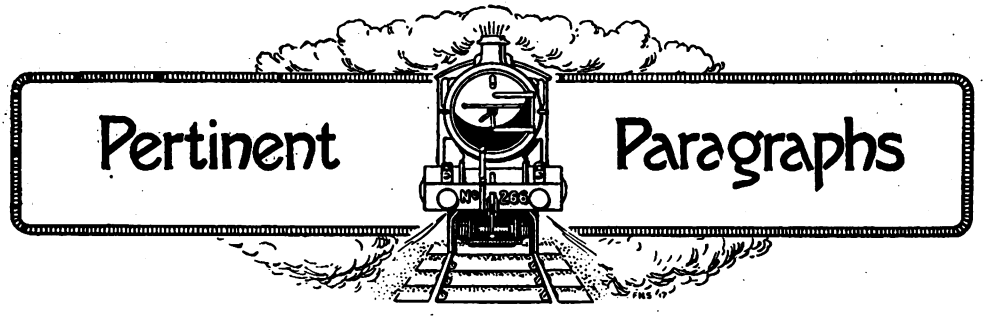

A Crewe-Built Armoured Train.

OUR frontispiece this month illustrates one of two armoured trains put together at Crewe Works, London and North Western Railway in the early part of 1915, and sent to the East Coast of England to form an essential part of the defences of the coast in case of bombardment or invasion.

Each train comprises two gun vehicles, two infantry vans and a tank engine provided by the Great Northern Railway, of the 0-6-2 type as employed in suburban service. The engine is placed in the middle of the train, and is entirely protected by steel plates ½ in. thick.

Driving may be done either from the engine footplate or from either end of the train by means of an "intermediate regulator valve" fixed on the side of the engine smokebox, and controlled through a link and lever actuated by a small vacuum cylinder on the engine footplate.

The underframe of each gun vehicle is an ordinary 30-ton steel flat wagon, 38 ft. long over buffers, and carried on a four-wheeled bogie at each end, capable of going round a curve of 1½ chains radius. At one end of the vehicle is fitted a 12-pr. Q.F. gun (with shield complete) fixed midway between the bogie wheels so as to distribute the weight equally on both axles. The platform is protected by ½ in. steel plates 3 ft. 2 in. high fixed firmly to the main frame of the truck, having loop holes 12 in. by 4 in. at intervals for rifle fire. These loop holes are fitted with sliding doors, which are closed when not used for firing. The remaining part of the truck is covered in by a steel plate structure divided into two parts—one for storing shells and ammunition for the 12-pr. gun, the other being used for a Maxim gun and fitted with cupboards for holding ammunition. It is also used as a residence for the officer in charge of the train. The sides are provided with loop-holes for rifle fire and openings for the Maxim gun, the whole of which can be closed by doors when not required for use.

The underframe of the infantry van is of steel; 46 ft. long over the buffers and carried on a four-wheeled bogie at each end. The upper structure is made of ½ in. steel plates, the sides being loop-holed for rifle fire. The interior is fitted with folding tables, lockers, drinking water tanks and a stove and racks for rifles. One of these vans is fitted inside with two coal bunkers, each holding 1 ton of coal for the use of the locomotive. Underneath the frame are fixed four water tanks, each containing 200 gallons of water for the use of the locomotive, water being fed into the engine tanks by means of an inspirator or water lifter. These are provided as a reserve of coal and water.

The train is fitted inside with carbide lights fixed to the sides of the vehicles, the generator being at the end of one of the infantry vans and loud-sounding telephones are installed in each vehicle so as to enable orders to be transmitted from one part of the train to another. Platforms are arranged between each vehicle and alongside the engine so that men can pass from one end of the train to the other. Equipment was carried out under the direction of Mr. C. J. Bowen Cooke, Chief Mechanical Engineer, to the order of the War Office.

War Effort of British Railways.

THE complete story of all that railways have done towards the war effort, now happily in process of consummation, would require several issues of the RAILWAY MAGAZINE, even were complete information available. Items of special note only can therefore be set forth in the limited space available, and in succeeding paragraphs selections thereof are given in continuation of particulars included last month relating to the London, Brighton and South-Coast Railway, and in regard to general statistics concerning war traffic on the South-Eastern and Chatham Railway, whose sea services receive attention. Before dealing with work on individual railways it may be mentioned that in addition to the enormous work performed as "essential industries," from a

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total pre-war male staff of 626,000, well over 184,000 were supplied direct to the Army or Navy, besides contributing thousands more for war service at the War Office, Admiralty, other Government departments, and in various civilian categories associated with war, munition, industrial, and national welfare (coal and food control, &c.) operations.

Some Great Western Railway Statistics.

33,615 Naval and Military passenger trains, including 5,000 on ambulance service (2,848 discharged at Great Western stations) with corresponding empty journeys in most cases, representing about 1,000,000 miles of travel; 1,139 special trains (included in the totals given) for American troops, all within 8 or 9 months last year; 2,145 special naval and military leave trains, no fewer than 550 having been provided last Christmas and New Year in connection with home service leave; 360 additional *daily* trains for workpeople at Hayes, Avonmouth, Henbury, Pembrey and Queen's Ferry (near Chester)—in one instance 26,000 single journeys had to be provided daily; over 41,312 special freight trains for Government stores, and 13,676 for Admiralty coal, with 8,361 return empties. Great changes occurred in the flow of traffic, and besides enormous accretions of traffic on the many main routes, inter-connecting routes such as those *via* Banbury and Basingstoke were exceptionally busy, as they connected railways north and south so as to avoid the London area. Many loads such as cordite paste, tanks, ammunition (in many daily trainloads), large guns, &c., involved special care and manipulation. Coal, previously seaborne, was a heavy factor: most of that for Admiralty purposes ran from South Wales to Scottish and North-East ports, about 5,500,000 tons being conveyed by the Great Western Railway. As many as 19 trains were run in one day for Scotland alone, and there were rarely less than 80 per week. Hay traffic for army forage supply was also a serious item, as many as 2,555 wagons with sheets and ropes, being required weekly for this alone.

Freight and Munition Traffic and War Work.

Compared with 1913 it is estimated that during the period 1914–18 some 15,000,000 additional freight train miles were run. Forty-seven munition works, storage depôts, aeroplane depôts, &c., established on the Great Western system, with 230 private works served by siding accommodation, created large volumes of traffic. In one case 32 miles of sidings were laid in. To meet war traffic demands 654 ordinary wagons were taken from service and adapted for conveyance of horses, guns, limbers, &c.; 638 passenger coaches were set apart for munition worker traffic, and 46 for ambulance train service in this country; and 95 engines. 6,567 goods wagons and 238 coaching vehicles were sent overseas. Altogether 216,350 wagons, many of 45-ft. bogie classes, were supplied for naval and military loadings. Work performed in the railway workshops included manufacture of gun and shell parts, complete shells and bombs, spares for foreign engines and rolling stock, ammunition fuses and cases, and ambulance stretchers. Thirty-one new signal-boxes were constructed and 910 working levers provided in connection with new Government works. Electricity plant and current were also supplied for various national purposes. More than 40 miles of permanent way complete (with an addition of 50,000 sleepers) and spare parts, representing 15,039 tons of materials, were supplied at the request of the Government, for use overseas. A large amount of permanent way materials was also found for Government use in this country.

Great Western Railway Steamers on War Service.

Of 10 Channel steamers owned, seven were commandeered by the Admiralty on the outbreak of war, the three turbine vessels being fitted as "ambulance transports." These did their work throughout without serious mishap. Others were utilised for naval purposes. The *Roebuck*, renamed *Roeduck*, was lost by collision early in 1915 at Scapa Flow; the *Reindeer*, *Lynx* and *Gazelle* served in the Mediterranean and Dardanelles. Incidentally, the *Lynx* achieved distinction by ramming a submarine. One of the boats had the unique experience of arresting a former sister ship, the *Antelope*, which had been sold to a Greek firm. Of the remaining vessels, the *Ibex*, the only one left for Channel Islands traffic, sank an enemy submarine by gun fire, and assisted as a transport for demobilisation. The five tenders at Plymouth were used for examining vessels approaching that port. In addition the *Atalanta* was fitted for salvage work. The *Smeaton* was loaned to the American Authorities for use in connection with the arrival of the American Army in France.

Great Western Railway Employees on War Service.

25,479 members of the Great Western staff, representing 32.6 per cent. of the pre-war establishment, joined the Colours during the war, and it is regretted that 1,955 have lost their lives. Amongst the staff taken on to augment the depleted strength were

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3,668 women and girls. Three companies of Constructional Railway Troops, attached to the Royal Engineers, were formed from the Engineering Department (12 of the officers therein also being provided), the first for service in Egypt and the remaining two for France. In addition, two civilian companies, numbering 287 men, were recruited in 1917 from the Engineering Department and worked in France under the War Office.

Great Northern Railway's Record.

NOTABLE especially for munition, industrial, and north to south coal traffic, this has been an exceptionally hardly worked line. Traffic proceeding from the West Riding, and centres in north-eastern counties and Scotland to the South of England in the end showed an increase of 125 per cent. on any pre-war records. To work trains over the Ludgate Hill and Metropolitan Widened lines section in London, banking engines had to be systematically employed. Over 3,000,000 wagons for goods and coal were conveyed this way. On the main line goods train loading was increased by 30 per cent. A special train, often in three or four parts, was run regularly for ammunition alone for France. Many special loads also had to be conveyed, including the first "tank," from Lincoln to Hatfield Park for demonstration and trial, under conditions of great secrecy. Coal traffic passing through Ferme Park yard increased by 60 per cent. Milk, fish, and other perishables also reached very high traffic totals. To facilitate cartage in London a special system of regulation was introduced with great advantage.

Passenger and Mail Traffic.

The presence of the Grand Fleet in Northern waters threw heavy military and naval traffic upon the Great Northern Railway, as also the large military camps at Belton Park and Harrowby (near Grantham), Ripon, Clipstone and Catterick, with the great naval aerodrome at Cranwell, near Sleaford, probably the most extensive in the Kingdom. Ordinary passenger services loaded exceptionally, with a record of 1,625 passengers by one train. The Gresley "twin-bogie" coaches gave increased load efficiency and were much used, some of the suburban sets being employed for secondary main line trains. Closing of pre-war routes to Northern Europe threw additional strain upon Newcastle and other East Coast ports. Parcels post mail bags for Russia, &c., at one time totalled well over 2,000 daily. To avoid congestion at King's Cross passenger station, parcels post traffic was diverted to the Goods Depôt. Other items of interest have been the selection of Boston as the first port used for the repatriation of British prisoners coming home and German subjects passing in the other direction; also in early stages, use of the Alexandra Palace for the thousands of Belgian refugees who passed in and out of that clearing station. Later the Palace was occupied by German prisoners, for the conveyance of whom, owing to the changes frequently made, a large number of special trains had to be run.

A "Kitchener" Record Run.

SPECIAL trains had occasionally to be run conveying high naval or military officers and representatives of the Government on errands of great urgency. One instance of this is historic, that is the journey of Lord Kitchener on his fateful mission to join the *Hampshire*. About half an hour after his departure a representative of the Foreign Office arrived at King's Cross and stated he must catch the special, as it was necessary for him to sail with the party. An impromptu special was arranged—being Sunday evening there was little selection in engines—but the road being cleared, the train was worked to Doncaster so speedily that it passed the 156 mile post in the record time of 149 min. (after a 4 min. stop to change engines at Grantham and 4 min. lost by relaying). Lord Kitchener, who had been advised by telephone at Grantham, waited a short time at York for the second special, which enabled the passenger to join the party.

Great Northern Railway and "Coast Defence."

From its geographical situation, the Great Northern Railway has been intimately concerned in coast defence schemes. Whilst happily these measures have not required to be put in operation, a great amount of preparatory work had to be undertaken, and some idea of the minute and elaborate arrangements necessary will be gained from the fact that the Great Northern had to make provision to deal at short notice with not less than 500 troop trains—apart from supplies, &c.—and some 40 of their stations were scheduled for purposes of entraining or detraining. Railway arrangements for the evacuation of areas required for military operations were also in readiness, and to admit of the various measures being put in operation at any time, certain key lines were kept open day and night, and a system of telephones improvised.

War Work at Doncaster.

IMMEDIATELY following the outbreak of war, assistance was asked in the construction of ambulance stretchers, and this was shortly followed by general service wagons, of which

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several hundreds were built at Doncaster at the rate of 30 per week. In October, 1914, it was realised by those responsible for armament that use could be made of the machinery in the railway locomotive workshops. The Great Northern Railway undertook, in conjunction with the North Eastern Railway, the manufacture of the parts of a number of 18-pr. field gun carriages, a class of work requiring accuracy involving work to limits of 3-1000ths of an inch. Orders for other work involving high accuracy and finish were received in connection with anti-aircraft guns, gun mountings for pedestal guns for mercantile marine, and many other things, from the end of 1914 until November, 1918. In November, 1914, orders were received for two armoured engines referred to in the first Pertinent Paragraph of this number, for which two Great Northern 0-6-2 tank engines were selected and armoured with $\frac{5}{16}$-in. plates. During the following six months, until the creation of the Ministry of Munitions, in addition to gun work given direct by the Government, assistance was also given to armament firms in the manufacture of parts of guns and gun carriages. In May, 1915, the repair of fired 18-pr. cartridge cases was added. Special machinery was improvised and women were engaged. Output from Doncaster shops rose to 50,000 cartridge cases per week, and some millions of cartridge cases were repaired there. Again, when there was such an urgent demand for shells in July, 1915, the company undertook the manufacture of 6-in. high-explosive shells. Some of the existing machinery in the turnery shop was removed and new shell lathes and other machines installed.

A number of 0-6-0 tender engines were sent overseas, and 23 were fitted with a special condensing apparatus which enabled them to be worked in advanced military areas. Vehicles and wagons were also supplied. One long branch was converted to single line to release permanent way material.

War Traffic on the London and South-Western Railway.

FROM the commencement of the war to November 30 last, over 20,000,000 troops were dealt with. These included 522,768 officers and 19,701,186 men. Loaded special trains run in connection with the conveyance of troops numbered 58,859. Close upon 1,500,000 horses were transported, besides 11,208 guns, 114,278 vehicles, 481,357 trucks of baggage, stores, &c., 37,418 bicycles, and 2,166 tanks. These details include 10,173 ambulance trains, and 1,814,810 invalids and attendants

War work of this company began actually before the declaration of war, and consisted of the conveyance back to their home stations, at short notice, of the 1st London Division and the Home Counties Brigade of Territorials who had gone into camp at Wareham and Salisbury Plain. This was light work to what followed when called upon to transport the British Expeditionary Force to France. The first train conveying the vanguard of the British Army was booked to arrive at Southampton Docks at 8.48 a.m. on August 10 and the last at 6.20 a.m., on August 31. The trains actually arrived at the port at 8.15 a.m. and 5.58 a.m. respectively. Some 670 trains were required for the conveyance of the Expeditionary Force, which consisted of 4,653 officers, 113,801 men, 37,649 horses, 314 guns, 5,221 vehicles, 1,807 cycles, and 4,557 tons of stores, &c.

Arrival of Canadian troops at Plymouth on October 12 furnishes the next feature. This required 92 special trains to convey them to Amesbury for Salisbury Plain. In addition to the movement of troops, large quantities of materials for the camps for the large number of military quartered on the London and South-Western system were conveyed by goods trains.

The 2,166 tanks were conveyed from Southampton to Dieppe and Cherbourg by means of the train ferry illustrated and described in the RAILWAY MAGAZINE, March, 1919.

War Activities on the Midland Railway.

IN the locomotive department 7,400,000 cartridge cases were renovated, 2,500,000 complete fuses made, and 1,350,000 fuse adapters and gaines, 1,300,000 copper driving bands and 25,000 gun mountings, besides thousands of details for guns, armoured cars and aircraft. Seventy-eight locomotives were supplied for service overseas. The carriage and wagon shops have built 1,500 service wagons, 100 meat vans, 750 20-ton covered wagons, and 40 trollies for carrying tanks, besides sending more than 6,000 10-ton wagons and other wagons, and 50 brake vans for use in France. They have also built nine complete ambulance trains. When the authorities in France found themselves very short of rails, the way and works department took up and sent out 28 miles of permanent way, with 55,000 sleepers, and necessary chairs and plates.

To deal with the excessive military traffic, the Midland Railway has run 18,000 special trains conveying 2,400,000 officers and men, 175,000 horses and 650 guns. 14,000 wagons and 25,000 tons of baggage. In 1917, the goods department dealt with 21,950,000 tons of goods, which is more by 1,450,000

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tons than in 1913; while the mineral department dealt with 31,880,000 tons of coal, which is 1,770,000 tons more than in 1913. Last year the number of passengers (including naval, military and Government free traffic travelling by Midland trains) was 147,000,000. This is an increase of 19,000,000 over 1917 and of 8,000,000 over 1916, and of 18,000,000 over the pre-war year 1913.

Great Eastern Railway's Contribution.

SINCE the commencement of the war over 12,000 special trains have been run for the conveyance of troops, and to December, 1918, inclusive, 5,935,365 men, 232,370 horses, 39,689 vehicles, 42,395 cycles and 40,000 tons of baggage were conveyed. During 1918 only, the number of troop trains run was 1,853, and the traffic conveyed included, approximately, 24,000 officers, 1,100,000 men, 14,000 horses and about 4,000 military vehicles of different descriptions, including guns, 15,000 cycles and 6,000 tons of baggage. Ambulance trains passing over the system during the same period numbered 322, conveying 54,000 patients. The total number of ambulance trains since the outbreak of war has been 1,140, conveying 170,644 patients. During the same period 3,479 special trains, principally of an emergency character, were run for the purpose of conveying Government traffic largely consisting of military horses, baggage, meat and other stores.

The Record of Stratford Works.

Built or equipped at Stratford: nine ambulance trains, seven for oversea use and the other two for Great Britain; fitted up complete two workshop trains for Egypt; built 225 large-capacity covered goods wagons and 440 road transport wagons; manufactured three-quarters of a million graze-fuses, adapters and gaines; manufactured about 900,000 copper shell bands; manufactured about 800,000 graze fuse stampings; painted 200,000 shells, and machined and finished complete 37,000 6-in. shells; manufactured 20,000 4.7 shell forgings, and, broken up 150,000 tons of steel into shell billets; brazed over 1,500,000 cartridge cases, and re-formed over 3,500,000 cartridge cases. In addition over £30,000 worth of work was done on gun and rifle details for Woolwich and the Small Arms Factories. In all, the value of this work has amounted to about £1,250,000, which would nearly represent in pre-war times two complete years' work for the whole of locomotive, carriage and wagon maintenance. In addition there are the special services rendered by the Great Eastern Railway fleet of steamers; also the use of Harwich and Parkeston Quay for naval purposes, as to which particulars cannot here be given.

Great Central Railway Material for War Service.

THREE trains of coaches were taken from stock and converted into ambulance trains for service in this country. An entirely new ambulance train of 16 vehicles was built at Dukinfield for the use of the American Armies in France. 3,267 high-sided goods wagons were put into condition equal to new and sent overseas; 40 new high-sided goods wagons were built and sent to France. Thirty-five goods brakes were built and 12 old goods brakes reconstructed and sent overseas. Thirty-three of the eight-wheels coupled engines were put into first-class order and sent to France, and three new engines of the same class built and sent to the same destination. Three more are nearing completion. Howitzer carriages and gun travelling carriages have been constructed, and no less than 5,512,745 18-pr. cartridge cases have been renovated and 76,900 high explosive shells manufactured. Innumerable spare parts have been made, and much other work done.

It will be recalled that no fewer than 500 engines have been built by various firms on the order of the War Office for service in France, the design being one prepared by Mr. J. G. Robinson, substantially agreeing with his latest 2-8-0 superheated class.

Highland Railway's Part in the War.

DURING 1918 3,500 special naval and military passenger trains were run, taking the sections north and south of Inverness separately, as the running staff of men is changed there on through trains. Incidentally the Highland Railway shared in the working of the largest distance booked journey in the British Isles, the daily naval train from Euston to Thurso and back. Special goods trains were even greater in number than the passenger trains. These were mostly carrying munitions, timber, meat, and supplies for the forces. Comparing pre-war days with the past year there were in 1913, 2,222,702 passengers, as against 3,344,480 in 1918, an increase of 1,121,777, or 50.47 per cent. In goods, &c., there were carried in 1913, 653,589, and in 1918, 1,323,437 tons, an increase of 669,848 tons, or 102.49 per cent. Live-stock traffic increased about 16.39 per cent. Tonnage of timber carried, included in the above figures, gave an average per month of 33,630 tons, 403,560 for the 12 months, 80,712 wagon loads of 5 tons each, or 2,690 trains of 30 wagons each, an average of eight trains a day for 313 working days. The Highland Railway had also to undertake

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vital traffic in connection with the war work of our Allies—the Americans—on the Kyle line, which practically excluded all other traffic, in connection with the American mine works at Inverness and Alness. Fish traffic has been abnormal, from the northern and western ports, and 300 fish trucks had to be borrowed for the purpose. From Inverness alone during the last three months of 1918 were forwarded 4,000 tons of herrings. It is anticipated that the Dornoch and Strathpeffer Hotels will be re-opened about the beginning of June, as the Americans have evacuated Strathpeffer, and the Canadian Forestry Department Dornoch.

War Traffic on the Cambrian Railways.

DURING the latter part of July, 1914, the 16th Brigade of the Regular Army, comprising 2,000 officers and men, with horses, carts, transport wagons and 200 tons of baggage, was encamped at Llanidloes, whilst an artillery camp composed of 500 men with horses, guns, transport wagons, &c., was at Rhayader. The Welsh Territorial Division was in camp at Aberystwyth and Portmadoc, there being 5,000 men at the former place and 4,000 men at the latter. At 9 p.m. on Wednesday, July, 29, 1914, an order was received for the transfer of the whole of the Llanidloes Camp to the North-East Coast, and special trains had to be immediately arranged for. These trains took every available vehicle—the ordinary holiday traffic was very heavy at the time as the war cloud had not then become visible to most people—even the workshops being completely emptied of all vehicles fit to run in order to meet the demand. The first train left at 7 on the Thursday morning, and the others followed at intervals of one and a half hours, the last of the specials leaving at 2.55 p.m. The Rhayader Camp was to have returned in instalments on the Wednesday, Thursday and Friday of Bank Holiday week, but on Thursday, July 30, orders were received to send the men and equipment on the following day to Plymouth. The break-up of the Welsh Territorial Camp was a far bigger undertaking. There were 9,000 men, and at 10 p.m. on Sunday, August 2, 1914, orders were received that they were to return immediately to their home stations. Twenty-six trains were required for the stock, which had to be gathered together and sent to Aberystwyth and Portmadoc respectively over a single line already very severely taxed with Bank Holiday traffic, and then conveyed under similar conditions to the various junctions with other companies' lines. A very large camp was erected near Oswestry, and a subsidiary camp at Bettisfield, and in connection with these, since the outbreak of war, no less than half-a-million men have been conveyed. A large quantity of South Wales coal passed from Talyllyn to Oswestry, and thence to Scotland for use of the Navy. No Cambrian rolling-stock was sent abroad, but to assist neighbouring lines goods trains have been running through regularly to Crewe, and during the last year or two of the war to Shrewsbury also.

War Traffic on the Glasgow and South-Western and North-British Railways.

LARGE quantities of coal from Fife and Lanarkshire were shipped at Ayrshire ports, and numerous cargoes of iron ore, which could not be discharged at these ports, were taken to the Glasgow Docks; this involved greater haulage, a longer use of wagons, and added to the pressure of transport generally. Welsh coal carried for Admiralty purposes amounted to 316,120 tons, over and above the railway's own coal traffic, and this was in addition to heavy traffic at various munition factories. Immense quantities of other material, foodstuffs of all kinds, soldiers, guns, horses and mules in thousands, all from America, were also conveyed from Glasgow Docks to English centres for Army purposes. Turnberry Hotel and Golf Links were taken over by the Government in January, 1917, to be used as a school of aerial gunnery.

ON the North British Railway there were *forwarded* during the year 1918 by goods train from stations on the system 755,000 tons of goods, 322,000 tons of coal and 172,000 tons of other mineral traffic. The number of naval and military units in respect of which warrants were collected, represented approximately 136,000 officers and over 1,000,000 men. By passenger train over 170,000 parcels under 2 cwt. each, and over 5,000 tons of heavier traffic were forwarded carriage free. Had cash payments been made by the Government in respect of the traffic carried free on their behalf, it is estimated that the value of the conveyance of such traffic for the year would have been for passenger train traffic £500,000, and for goods train traffic £1,250,000, in all £1,750,000.

S.E. and C.R. Steamers on War Service.

LAST month particulars were given of war services rendered by the Joint Committee on land and at Channel ports. This may be completed by reference to the work of the steamers. Before the actual declaration of hostilities all vessels were in readiness for Government requirements.

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Cross-channel services were transferred to Folkestone and two days after war was declared the cargo vessels were sent to Newhaven. The *Hythe* claims to have landed the first British troops at Le Havre. In September, 1914, a service was inaugurated between Dover and Dunkirk. South-Eastern and Chatham Railway vessels took a leading part in the removal of refugees from Belgium, the *Invicta*, *Victoria* and *The Queen* bringing about 4,000 from Ostend on October 14, 1914, the day the Germans entered the town. In addition to the transport of troops and members of the various auxiliary services, the vessels carried an enormous volume of traffic in the shape of mails (350,000 tons) and Government stores (100,000 tons) of every description. Apart from their transport duties the vessels at various times have been specially retained to convey H.M. the King and other Royal personages to and from France, also many members of the Government have requisitioned special steamers.

The following vessels have been lost: the *Hythe*, one of the newest cargo type, in the Dardanelles, early in the war; *The Queen*, sunk by German destroyers, October 26, 1916; the *Achille Adam*, cargo steamer, sunk by submarine, March 23, 1917; the *Onward*, lost by fire at Folkestone last year. Special honour attaches to *The Queen* for the rescue of Belgian refugees from the *Amiral Ganteaume*; a few days later the *Invicta* stood by and picked up survivors from H.M.S. *Hermes*, torpedoed; in September, 1916, *The Queen* towed the transport *Queen Empress*, disabled by collision, into safety; and the same month the *Victoria* assisted the transport *Golden Eagle*, disabled.

Passenger steamers *Engadine*, *Empress* and *Riviera* were fitted as seaplane carriers in Government service, and rendered special service in the Battle of Jutland and other historic operations; the *Hythe* and *Folkestone* became mine-sweepers; the *Biarritz*, launched December, 1914, was commissioned as a mine-layer; the *Maid of Orleans*, launched March, 1918, employed as a troop transport.

Work of the Shore Staffs.

Reference is necessary to the work done by the shore staffs at Dover and Folkestone. It has fallen to these men to handle the great despatches of mail and the enormous quantities of Government stores so necessary to the armies engaged across the Channel. In addition, they maintained Government services to Dunkirk, shipped material for the Inland Water Transport Service overseas, and dealt with the bulk of the material required to establish the base at Boulogne. The work of coaling troop and ambulance transports formed no small part of their duties, and the disembarkation of thousands of wounded at Dover necessitated the attention of large staffs. Nor should be overlooked the work done by the marine workshops of the company. Apart from the work entailed in the upkeep of the railway's steamers, the repairing staffs have had their duties and responsibilities largely increased during the war by repair work carried out to the ambulance and troop transports based on the ports of Dover and Folkestone.

Other Railway Steamers on War Service.

VARIOUS other items of information concerning the war service of railway steamers may be collected together pending fuller details. In the case of the London and South-Western Railway special claims may be advanced on behalf of the "Channel Patrol" from Southampton to France. During the whole of the war, although the service has been slightly curtailed, that between Southampton and Havre was never suspended once. The captains of the Havre steamers were recently presented by the British military authorities and others at Havre with an illuminated address and a substantial cheque in appreciation of the courage, skill and courtesy displayed by them while performing the cross-Channel services, for the most part unescorted. Three of our ships were lost through enemy action, none of them, however, until the early part of last year. There is a curious and interesting rumour current that this freedom from loss was owing to the Germans having used the port of Southampton so freely before the war, and to their hopes of getting back and trading there again at the end of the war, that they had entered into a compact with the London and South-Western Railway Company that these steamers would not be attacked. Unfortunately, within a very short time of the starting of this rumour the first boat was lost.

After war was declared the Government took over most of the East Coast fleet of the Lancashire and Yorkshire Railway, and also certain vessels belonging to the Lancashire and Yorkshire and London and North-Western Joint services. The steamers *Rye*, *Unity*, *Don*, *Hebble* and *Dearne*, of the East Coast fleet, have been lost, and the same remark applies to the ss. *Duke of Albany*, of the joint fleet. The Government did not take over either of the vessels belonging to the Liverpool and Drogheda service and this has been maintained without mishap.

In Scotland, four North British vessels,

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the *Marmion, Kenilworth and Talisman* from the Clyde Fleet, and the *William Muir*, Granton and Burntisland ferry service, were utilised by the Government. With the exception of the *Glen Sannox* all vessels belonging to the Glasgow and South-Western were taken over. All the Caledonian Railway Clyde steamers were also commandeered, and have been variously employed, some as mine-sweepers, some in transport services and one of them is at present far away, in Egyptian waters. The *Duchess of Hamilton* and the *Duchess of Montrose*, while employed in mine-sweeping, were totally destroyed by exploding mines. The turbine steamer, the *Duchess of Argyll*, has been doing successful work as a cross-channel transport.

Great Eastern Rai way and Parkeston Quay.

A NEW steamer, the *Felixstowe*, is due for delivery to the Great Eastern Railway very shortly, for addition to the Continental fleet, and two more are on order. The Admiralty, at the outbreak of war, commandeered the whole accommodation at Parkeston Quay, and the up-to-date and complete equipment there has without doubt contributed materially to the successful working of naval enterprises based upon Harwich. In this connection a letter received from the Admiral in charge by the marine engineering staff at Parkeston may be quoted :—

"I cannot say how much I felt indebted to the members of the staff of the Great Eastern Railway for the absolutely invaluable help they have rendered throughout the last few years. It has been rendered too with such a good will that our association has been a real pleasure. We have all felt that at Parkeston we had a strong and willing backing of real friends who were eager to help us in every possible way, and who could always be trusted to turn out work of the highest class.

"It would have been easy to have created friction, but there has been anything but that, and I am sure your own personal attitude has been responsible for the happy results.

"At the time of the signing of the armistice, I expressed to the Admiral here, our deep obligations to the Great Eastern Railway works, and I understand that he has thanked you.

"I am glad that the relations between our staffs have been so extremely cordial."

Special War Traffic at Alexandra Docks, Newport.

Now that hostilities have ceased, it is permissible to give shortly some account of the traffic dealt with at the docks during the war. Obviously, the usual trade, except the export of coal, gradually disappeared and its place was taken by imports and exports of war material and foodstuffs, whilst during a period of extreme congestion at Southampton and other passenger ports, caused by the transport of troops across the Channel, the Alexandra docks were used to some extent for passenger and mail traffic. A considerable number of first-class passenger ships owned by the Cunard, Union Castle, Royal Mail, Leyland, Peninsular and Oriental, Pacific Steam, as well as other passenger lines hailing from the colonies, some converted into auxiliary cruisers and others into hospital ships also made use of the docks. Some of these steamers were of considerable size.

The opening of the large entrance lock a fortnight before the outbreak of war brought into use a national asset of considerable magnitude, and it would have been impossible to have dealt with such vessels at Newport with the accomodation formerly existing. Prior to the war little or no foodstuffs were dealt with at Newport, but during the war period tens of thousands of tons have been handled, some in very large consignments, one part cargo of grapes alone numbering between 43,000 and 44,000 barrels. Many hundreds of thousands of tons of all classes of war materials were also shipped from Newport Docks, including tanks and machinery of all kinds. Many captured cargoes were taken into Newport. One comprised complete trains of Turkish locomotives and passenger carriages. There were also huge quantities of medical comforts and R.A.M.C. stores, officers' kits and relics from the disastrous Serbian retreat.

Electrification Results on the L. & S.W.R.

IN the year 1913 the number of local passengers carried in the suburban area, which has since been electrified, was 25,000,000. During 1915, the year before electrification, the number had fallen to 23,000,000. In 1916, during the year, electrified services were gradually being brought into operation, the number had increased to 29,000,000. The following year the number was 33,000,000 ; while last year the number was 40,000,000, an increase of no less than 17,000,000 compared with the year 1915, or 74 per cent. A proportion of this increase is due to the peculiar circumstances that apply at the present time, but, on the other hand, there is every indication that a large proportion of the increase is of a permanent nature, and that the traffic is likely to be considerably heavier than was ever anticipated. An escalator is being provided from the platform level to

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the Waterloo and City Railway, and this is expected to be in running order this month.

Pullman Cars on the Caledonian Railway.

COMMENCING Saturday, March 1, the Caledonian Railway resumed the service of Pullman cars inaugurated in the summer of 1914, but which had to be suspended in consequence of the war. They consist of dining cars, buffet cars, and an observation buffet car. The dining cars contain first and third class accommodation, for which there is no extra charge; the buffet cars are available for first-class passengers on payment of a small supplementary charge. All the seats are numbered and may be reserved. The cars in service are named as follows: *Helen Macgregor, Flora Macdonald Lass o' Gowrie, Fair Maid of Perth* and *Duchess of Gordon*, between Glasgow and Aberdeen and Edinburgh and Aberdeen; *Annie Laurie*, on the Moffat service; *Baroness Nairne*, between Glasgow and Crieff; and *Maid of Morven*, on the Oban route; while between Glasgow and Edinburgh ply *Mary Seaton* and *Mary Carmichael*.

For the present the Pullman service consists of buffet cars between Glasgow and Edinburgh; and dining cars between Glasgow and Carstairs, and between Glasgow, Perth and Aberdeen.

Claims Prevention Publicity Campaign.

THE campaign which railway companies are organising with a view to educating traders and the public as to how it is to their own interest that consignments should be better packed, was successfully opened by a meeting of gentlemen held at the Great Eastern Hotel on February 27. Mr. T. W. Watts, Commercial Superintendent, Great Eastern Railway, presided, and he was supported by Mr. Cecil Graseman and Mr. E. M. Brough, London and North-Western Railway; Mr. John Johnson, Great Western Railway; Mr. T. C. Jeffrey, Midland Railway; and Mr. Geo. H. Dennis, London Brighton and South Coast Railway. Others present were Mr. A. C. Harris and Mr. F. Hare, London and North-Western; Mr. F. V. Milton, London and South-Western; Mr. J. Studd, Great Eastern; Mr. T. W. D. Smith and Mr. W. H. Charlesworth, Great Central; and Mr. A. E. Dixon and Mr. E. A. Davis, South-Eastern and Chatham. Important speeches were made by Messrs. Watts, Graseman, and others, while examples of good and bad packing and other demonstrations were exhibited. Incidentally, Mr. Watts mentioned that it was an unfair temptation to the staff to see the contents of broken packages lying about, and it may be that this was one of the causes of the greatly increased number of thefts which had been noticeable during the past few years. Mr. Graseman remarked that there was another phase of the situation, *i.e.*, the number of men injured through the bad packing. The London and North-Western Railway had 145,000 claims, many cases due to bad packing, for a period of 12 months—damage only. At one station for six months 12 men were severely injured through the insufficient packing of goods.

Standardised Wagon Designs for British Railways.

AT a recent meeting of the Institution of Locomotive Engineers (Leeds Centre) Mr. H. N. Gresley, Locomotive Engineer, Great Northern Railway, who presided, deplored the fact that Mr. J. R. Bazin, whose paper on "Suggestions for Standardised Wagon Designs for British Railways" was to be read, was unable to be present owing to illness, and in his absence the Paper was read by Mr. Houldcroft, the Local Secretary.

Mr. Bazin commenced by pointing out that uniformity in the design and capacity of the wagon rolling-stock of British railways was among the many reforms shown by the war to be necessary, and went on to point out that from the earliest days each company has designed its own peculiar type of vehicle, while private firms have also been required to provide wagons for their own and other traders' use. The author dealt with the wasteful system in use prior to 1917 of returning wagons to the owners empty, which practice was considerably reduced by the introduction of the Common User arrangement in January, 1917. The advantages of standardisation were outlined from a practical and also a military standpoint, and also from the point of view of the builder, user and repairer of the wagons.

Suggested Types.

Types of wagons selected for standardisation were five in number, as follows:—

(1) 12-tons open wagon with high sides.
(2) 12-tons open wagon with medium sides (to fall).
(3) 12-tons open wagons with low sides.
(4) 12-tons covered wagon.
(5) 20-tons open wagon for coal.

The 12-tons capacity wagon was to be preferred for four of the types on account of its dimensions being able to be kept within reasonable limits, and it can be handled in the shunting yards, warehouse, docks, and sidings, with equal ease. An important point in favour of 12-tons wagons is the advantage gained in carrying capacity as compared with 10-tons wagons without a corresponding increase in tare.

The 20-tons coal wagon is included because

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it seems advisable that a wagon of this type should be standardised for the conveyance of loco. coal, as most collieries are now able to deal with them.

The four types of 12-tons wagons can all be constructed with the same wheels and underframes, but the 20-tons wagon would need another design of slightly increased dimensions on account of its greater carrying capacity.

Mr. Bazin dealt exhaustively with the loading dimensions of the various wagons selected for standardisation, these dimensions being governed by the loading gauges of the various railways. Under the prevailing conditions the maximum dimensions must not exceed the minimum gauge of each individual railway. The constructional details were also gone into, the question of steel *versus* wooden wagons being commented upon.

Advantages of Standardisation.

In conclusion, Mr. Bazin stated that the advantages to be derived from standardisation of wagons cannot be over-estimated and this time, when reconstruction is the order of the day, is the most opportune to bring it about. There should be no delay on the part of the different railway companies in adopting the principle, as both from a manufacturing and economical point of view, as well as from a national aspect, the sooner it is put into operation the better, and the sooner will come the day when the many variations of wagon designs will have disappeared from our railways.

Mr. Gresley pointed out that in general the paper sets out the experience of many years in the maintenance of railway wagons, and the author had dealt very fully with the advantages of standardisation, but in order to get the best results it will be necessary to standardise the various railway loading gauges. Standardisation, he said, would give an increased carrying capacity, with a saving in tare weight, and the width of our wagons could easily be increased to give that extra carrying capacity. By the extra width the length could be decreased, which was a great point because of the length of sidings. A matter of considerable importance, in Mr. Gresley's opinion, was the relation between the carrying capacity of a wagon and the load carried in this country, the average load being far below the average capacity. This means that wagons are made strong enough to carry say 12 tons, or 20 tons, and yet are never called upon to carry these loads, the result being a waste of material in the construction of the vehicles, and a considerable waste of engine power in hauling unnecessary tare weight. Mr. Gresley spoke at some length on the question of private owners' wagons, there being, he said, a considerable loss involved in sorting out and returning these wagons, empty, to the collieries and to owners. He strongly advocated a common pool for all wagons, which would be one of the first results of the nationalisation of railways if that should ever come about.

Mr. Dow said that in his opinion the war had brought before our notice the great need for standardisation in everything appertaining to the wagon world. He considered it will hardly be possible for the whole of the traffic to be carried in the five types of wagons proposed by Mr. Bazin, but possibly other types were looked upon as special wagons, suitable only for special traffic, that is for perishable goods, insulated and other types. The 17-ft. frame which Mr. Bazin had brought to notice is the length of frame adopted by the North Eastern Railway for their open goods and other wagons, so that the North Eastern Railway had been standardising their wagons for some considerable time.

High-Capacity Wagons and Steel Construction.

After several members had expressed their views, Mr. Houldcroft said he considered that Mr. Bazin's suggestions were to suit existing conditions. These conditions had for thirty or forty years dictated the type of wagon which had been so supplied and it is now contended that because there are so many thousands of these types, therefore conditions could not be altered. He maintained that the result of following the conditions was a multiplication of varied types, and asked: "Are the conditions unalterable?" He further suggested the removal of anything which interferes with a railway and its efficiency as a first-class freight-carrying machine. He maintained that with high-capacity modern wagons, on a total freightage of 600,000,000 tons per annum, a saving would be possible of £20,000,000 per annum, which, capitalised at 5 per cent. would justify an expenditure of £400,000,000 sterling.

Mr. Houldcroft further remarked that he had had a vast experience, and upon lines where the rolling-stock was in his charge, after a searching investigation, wooden wagons were condemned for renewal after 25 to 30 years, steel wagons 35 to 40 years, and with such steel wagons in busy seasons he had records of only 2 per cent., and at times 1 per cent., under repair at one time. Could any English line show such a record? No special appliances were found necessary at out-stations. He furnished many sta-

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tistics concerning English and foreign railways, and claimed that the vital interests of the country demanded further inquiry. A committee of experts should be appointed to deal with this matter.

The Late Coal Controller.

IT is questionable whether the death of a railway officer has ever provoked so much regret on the part of the public as that of Sir Guy Calthrop. True, it was as Coal Controller, and not as general manager of the London and North-Western Railway that he was known to the bulk of the people in the British Isles. The immediate cause of his death was influenza, but there is little doubt his long and arduous labours and his intense anxieties as Coal Controller caused him to fall an easy victim to the epidemic. Like Lord Rhondda, he must be regarded as a martyr to public duty, and it must be admitted his life has been sacrificed for the nation.

RAILWAY MAGAZINE readers will remember him mainly as general manager, Caledonian Railway, 1908–1910; then general manager of the Buenos Aires and Pacific Railway, 1910–1914 In the latter year he returned as general manager—after the outbreak of war—to the London and North-Western Railway, on which his early railway years were spent. He was soon claimed by the Government for national services, and right well and devotedly were they performed by him. On the occasion of Sir Guy receiving his baronetcy, his portrait and biography appeared in the RAILWAY MAGAZINE, July, 1918.

Overcrowding on the "Underground."

THAT this evil is fully appreciated by officers of the underground system of railways is indicated by a statement recently furnished by Mr. Z. E. Knapp, Manager for Maintenance and Construction, showing the difficulties under which the engineering departments and those responsible for the supply of power have been labouring during the past four and a half years :—

The whole difficulty may be summed up in the statement that, while the passenger traffic of London has increased, transport accommodation has not increased to keep pace with it. The tax upon the railways has also been proportionately greater because many 'bus services have had to be reduced. War work has brought more people in and out of London at the busy periods, and war conditions have prevented the traffic expansion which would normally have met the case.

In common with all other railways, the Underground has been severely handicapped by the withdrawal of skilled labour and the restriction of materials. In the early days of the war, a large proportion of the technical staff joined the Colours. Add to this a growing shortage of materials--timber, wheel-tyres copper, brass, gears, electrical equipment have all been very short—with a deterioration in quality of those that were obtainable, and it will be realised the difficulties of war-time maintenance. At the present time, every available car that can be worked is in service, and the number actually working is about 90 per cent. of the total stock. Compared with the end of 1914 and beginning of 1915, the present load from Lots Road power station shows an increase of 17 per cent. to 18 per cent., and this in spite of labour difficulties and shortage of supplies. The greatest difficulty here is in regard to the coal supply, and this trouble has been with us increasingly since 1915, when it was first necessary to burn a percentage of inferior coal mixed with the usual supply. This inferior coal is poor in steam-raising qualities, and contains an abnormal amount of ash and clinker. Just before the war, a 15,000 kilowatt turbine was obtained for Lots Road, and this was put into commission in 1915. The results were so good, and the saving in coal so large that arrangements were put in hand to instal a second one of the same size. Incidentally, this would have saved some thousands of tons of coal, but the permit could not be obtained, and the project had to be abandoned. The permit has now been received and contracts placed for the second set.

New Rolling Stock to be Available.

On the District Railway, arrangements are being made to place orders for cars, so that all trains passing through the tunnel section may be made up to eight cars. Designs are in hand also for a new type of rolling-stock, which will be larger and equipped to deal more expeditiously with the enormous traffic to be handled. On the London Electric Railway we hope to complete shortly the special stock for the Watford line extension of the Bakerloo. This work was stopped by the war, and the Watford trains had to be composed of cars belonging to other lines. The release of these cars will make it possible to increase the length of the present trains. Still more relief will be given when the work of remodelling the Tube cars can be proceeded with. Just before the war, the company was engaged in altering these cars, in order to provide middle doors in addition to the end ones; this change should do much to reduce the discomfort of the rush-hour traffic. Another pre-war scheme is the Central London extension from Wood Lane to Ealing. It is hoped to complete the rolling-stock by the time the line is equipped by the Great Western Railway, and this

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extension should materially relieve the pressure on the District Railway. The City and South London Railway is to be remodelled on the lines of the London Electric and a connection made at Euston, which will enable through trains to be run from Clapham Common to Hampstead and Highgate, via the Bank.

The Channel Tunnel.

FROM the daily press, RAILWAY MAGAZINE readers will have learned that the British Government has withdrawn opposition to the construction of the long proposed railway tunnel beneath the Straits of Dover, and not a few will join with us in congratulating the Channel Tunnel Company on this happy consummation of the propaganda of its Chairman, Baron d'Erlanger, and its Parliamentary spokesman, Mr. Arthur Fell, M.P.

As recorded in the RAILWAY MAGAZINE, July, 1918, the proposals are that two parallel tubes be constructed, as in the case of the great Simplon Tunnel (12½ miles in length) under the Alps. The work of excavation will be performed by revolving cutters, fixed in Greathead shields, and all the work will be carried on by electrically-driven machinery. The diameter of each tunnel will be 18 ft., to accommodate all the great European express trains. It is intended that the tunnel shall be worked, ventilated and pumped by electricity. No combustion of coal on the railway will be necessary.

It is suggested that the tunnel shall be maintained under the authority of the War Office, and the plans include a dip in the level of the rails forming a "water lock," by which the tunnel could, in the case of emergency, be filled with water for a length of a mile.

In the past, even those who have opposed the construction of the tunnel from military motives have admitted the many advantages that must accrue to Great Britain when once it is working. London, as the railway terminus of the great express-train services to the European capitals, will have its position as the world's metropolis absolutely assured.

RAILWAY MAGAZINE readers will watch with intense interest the development of the scheme which, although approved by the Government, requires Parliamentary sanction before it can be put into operation.

Separation of European and Non-European Passengers.

IN South Africa, since the passing of the Railways and Harbours Control and Management Act (22) of 1916, considerable progress has been made in the direction of providing separate accommodation on trains for European and non-European passengers. Entirely separate coaches are attached to all important trains, by which any considerable number of non-European passengers travel, and on other trains one or more first and second-class compartments are reserved exclusively for non-European passengers. Separate accommodation for European and non-European passengers is now available on all main line trains, and on all branch lines, with but few exceptions, mainly in the Cape Province. Everything possible is being done to meet all reasonable requirements in this respect at the earliest practicable date. To provide a special coach on some trains would necessitate either the restriction of the accommodation for European passengers, or the attachment of a second engine, while, as a general rule, the coach would be occupied by, at the most, two or three non-European passengers.

The following statement shows the progress made in providing special first and second-class coaches for segregation purposes:—

In service—	
Coaches for exclusive use of non-European passengers ..	165
Coaches for both European and non-European passengers, but affording complete segregation and separate lavatories	67
	232
On order—	
Coaches for exclusive use of non-European passengers..	10
Coaches for both European and non-European passengers, but affording complete segregation and separate lavatories	1
	11
TOTAL	243

In addition, 609 special carriages are in use, solely for the conveyance of natives travelling third-class or in batches.

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WHAT THE RAILWAYS ARE DOING.

Mr. E. A. CLEAR, who has been Assistant to the General Manager, Great Central Railway, since 1912, was, at the last meeting of the Board, appointed Assistant General Manager. Before joining the Great Central Railway service, Mr. Clear was for 20 years in the Traffic Department of the Great Northern Railway. Beginning as clerk in the District Superintendent's office, King's Cross, he had three years' work in passenger and goods departments at suburban stations. After experience as train clerk in the Superintendent's office, he was District Travelling Officer, with Grantham as a centre. Mr. Clear joined the Great Central Railway service in 1898 as Signal Superintendent, and two years later was promoted to be District Superintendent of the Southern District on the opening of the new line to London. In 1901 Mr. Clear was promoted to be District Superintendent in South Yorkshire, and in the following year became Assistant Goods Manager at Manchester. Since that time his duties have required attention both in Manchester and London. In 1903 he was elected a member of the Board of Faculty of Commerce, and delivered a series of lectures on Railway Transport at the Victoria University, Manchester. Mr. Clear took over, in 1904, in addition to his other work, the managership of Messrs. Thompson, McKay and Co., the carting agents for the Great Central Railway in Manchester, and in the year following he made a tour of inspection of the railways of Canada and the United States, and acted as delegate to the International Railway Congress at Washington. He succeeded Mr. J. Rostern as Assistant to the General Manager in 1912.

Mr. E. A. CLEAR,
Appointed Assistant General Manager, Great Central Railway.

* * *

MR. THOMAS HENRY RENDELL has terminated his official duties as General Manager of the Barry Railway, but the directors, when accepting his resignation, appointed him as Consultant. Mr. Rendell vacated the position of Chief Goods Manager, Great Western Railway, to be General Manager of the Barry Railway in 1912.

* * *

MR. WILLIAM WADDELL, M. Inst. C.E., Engineer of the Barry Railway, has been appointed General Manager in succession to Mr. Rendell. Mr. Waddell was one of the late Sir John Wolfe Barry's staff on the construction of the first dock and railways at Barry. On the completion of this work he was engaged by Foster, Brown & Rees for about 12 months in the survey and preparing of plans for the Vale of Glamorgan Railway, which is now worked as part of the Barry system. In 1891 he joined the engineer's staff of the Barry Railway, and in the year 1893 was appointed Assistant Engineer under the late Mr. James Bell, succeeding him as Engineer in 1903. Mr. Waddell is a member of the Institution of Civil Engineers, of the South Wales Institute of Engineers, and other learned societies.

* * *

MR. M. C. HARRISON, Deputy-Engineer of the Barry Railway, has been appointed

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Residential Engineer, in succession to Mr. W. Waddell. Mr. Harrison joined the staff of the Barry Railway as a pupil under the late Mr. James Bell, and has spent all his adult life in the service. On Mr. Bell's death Mr. Waddell was appointed Superintendent Engineer, and Mr. Harrison became his assistant, and has held the post ever since.

* * *

OWING to considerations of health, Mr. Henry Evans has retired from the position of Chief Goods Manager of the Midland Railway, which he had held since March 1, 1905. Mr. H. F. Loney has been appointed Chief Goods Manager in the place of Mr. Evans. Mr. J. Pepper has been appointed Assistant Goods Manager.

* * *

WE regret to record the death of Mr. W. Herbert Williams, Superintendent of the

The Late Mr. W. HERBERT WILLIAMS,
Superintendent of the Line,
Cambrian Railways, 1914–19.

Line, Cambrian Railways. Mr. Williams entered the Cambrian service in 1877, becoming Assistant Trains Clerk in 1885, Chief Assistant Trains Clerk in 1898, Chief Assistant to the Traffic Manager in 1910, and Superintendent of the Line in March, 1914. Foresight and courage were Mr. Williams' leading characteristics, and he was particularly skilled in arranging the working of heavy military and holiday traffic over long stretches of single-line railway.

IN addition to the appointment of Mr. Charles Aldington, C.B.E., to the position of Assistant General Manager, Great Western Railway, the following staff changes have been made:—Mr. R. H. Nicholls, Assistant Superintendent of the Line, to succeed Mr. Aldington as Superintendent of the Line. Mr. F. J. C. Pole to be Assistant to the General Manager vice Mr. R. R. P. Glover, who has retired. Mr. J. F. Lean has been made Chief Clerk in the General Manager's Department in succession to Mr. Pole.

* * *

MR. H. MANOCK, for the past eight years Superintendent of the Lancashire and Yorkshire Railway Company's Wyre Docks at Fleetwood, has been appointed Superintendent of the Eastern or Yorkshire Division of the system.

* * *

MR. THOMAS ALLISON, Superintendent, Central Station, Glasgow, since 1902, and who is about to retire, has been in the service of the Caledonian Railway for fully 40 years. He is a native of Mid-Lothian, and at the age of 17 entered the Caledonian service as a porter. He was soon promoted to be a passenger guard, and after six years in that capacity he was appointed stationmaster at Newarthill, on the Edinburgh line. He afterwards held similar positions at Holytown, Mossend and Carstairs Junction, from which station he was promoted to the most important stationmastership on the Caledonian Railway. At the time of Mr. Allison's appointment the Central Station was in course of reconstruction, and his varied experience was found of considerable value in the rearrangements of platforms, and in making other necessary changes. Mr. Allison's retirement will take effect as from May 28.

* * *

SIR SAM FAY, General Manager, Great Central Railway, has been elected a member of the Board of the Buenos Ayres Great Southern Railway, and he has likewise been elected a director of the Buenos Ayres Western Railway.

* * *

MAJOR E. S. HAWKINS, who has for some time past been engaged with His Majesty's Forces, has resumed his duties as Manager and Secretary of the Colne Valley and Halstead Railway.

* * *

MR. JOHN WILKIE has been appointed Traffic Superintendent, Southern District, North British Railway, with headquarters at Carlisle. He succeeds Mr. Philip, retired. Mr. Wilkie commenced his railway career as a junior clerk at Gourdon, in Kincardineshire, and was subsequently employed at various stations on the system. About 27

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years ago he was transferred to the general superintendent's office at Edinburgh, where he was employed in various departments, and held the position of chief claims clerk and then chief excursion clerk. In January, 1917, he became chief assistant to the commercial superintendent at Edinburgh, and for the past year he has acted as chief assistant to the district superintendent at Glasgow.

* * *

IN the course of his address to the shareholders of the Furness Railway, at the recent annual meeting, the Chairman (Mr. F. J. Ramsden, J.P.) made the following references to Mr. Alfred Aslett:—"Mr. Alfred Aslett, who has been General Manager since 1895, and Secretary and General Manager since 1897, has retired from the service after a long and successful administration, and I feel satisfied that every shareholder will unite with the directors in wishing him a long and happy period of rest. In April last he was succeeded as General Manager by Mr. Lionel Speakman, one of the London and North-Western officers, and Mr. George Linton, Mr. Aslett's Chief Assistant in the Secretarial Department, succeeded him as Secretary. Mr. W. F. Pettigrew also retired on March 31, 1918, after a service of 20 years, and was succeeded by Mr. David L. Rutherford, who since 1910 has been the Engineer, and who now combines the duties of Engineer and Locomotive and Wagon Superintendent. I am glad to be able to tell you that the experiment of combining the two posts has been most successful, as the common control operates in the direction of the closest co-ordination and economy between these two important departments."

* * *

IN the last issue of THE RAILWAY MAGAZINE it was intimated that another presentation was about to be made to Mr. Alfred Aslett, J.P., the recently-retired General Manager of the Furness Railway. This has since been made at the company's offices, when Mr. Linton (Secretary) presented an address from the secretarial staff. Mr. Linton said the address was in brief form, because its primary purpose was as a memento of personal farewell and as an addition to the part taken by the secretarial staff in the general testimonial to Mr. Aslett on his retirement—a testimonial that had been subscribed to by the largest number and for the largest amount that had been known in the F.R. service. He paid tribute to Mr. Aslett's great ability, wonderful memory, hunger for work, tireless assiduity in the interests of the company and the public served by it, also to his phenomenal mental and physical activity, which had carried him through 23 years of toil and stress in his successful administration without "turning a hair." Mr. Linton also alluded to Mr. Aslett's regard for the welfare of the staff, and made a graceful reference to Mrs. Aslett. Messrs. Longrigg and Thompson spoke in support of the secretary's remarks, and Mr. Aslett, in his reply, returned thanks for the kind words Mr. Linton had conveyed to him, which were greatly appreciated, and would ever remain in his memory. He was deeply sensible of the great compliment paid him in presenting him with this artistic address as a token of loyalty and esteem on his retirement from the dual position of Secretary and General Manager of the Furness Railway after 23 years of exceedingly responsible work. The address is a novel and artistic production, the illuminated inscription being by Messrs. Waterlow & Sons and the border consisting of photographs, by Mr. F. W Bentley, Barrow.

* * *

MR. G. H. GRIFFITH has been appointed Goods Manager of the Egyptian State Railways and has been succeeded by Mr. S. R. Hibbert as General Traffic Superintendent at Gabbary (Alexandria).

* * *

THE Westinghouse Brake Company, Limited, have appointed Captain T. Barty, late of the Royal Engineers, to act as their representative with the British and foreign railway companies. Captain Barty has for some time been acting as Brake Engineer at the Base Locomotive Workshops of the British Expeditionary Force in France. He was, before the War, Manager of the Steam Heating Department of the Westinghouse Brake Company, Limited, and previously Assistant to the Outdoor Locomotive Superintendent of the Caledonian Railway.

* * *

MR. R. CROSS, Midland Railway Stationmaster at Tilbury, who was recently awarded the M.B.E., has received a letter notifying him that His Majesty the King of the Belgians has been graciously pleased to create him Chevalier de L'Ordre de Leopold II, in recognition of the constant and generous help given to his country in the course of the war. A medal of the Order accompanies the letter.

* * *

MR. R. G. MILLER, Locomotive Superintendent of the Belfast and County Down Railway, has resigned after a service of 40 years with the company, but continues to perform his duties until a successor is appointed. Mr. Miller was previously with the London and North-Western Railway at Crewe and Greenore.

* * *

MR. H. J. MOORE, General Manager's Department, London and North-Western

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Railway, who has acted as Secretary to the Overseas Ambulance Trains Sub-committee of the Railway Executive Committee since the early days of the war, has been enrolled as an Honorary Associate of the Order of St. John of Jerusalem in England. In recognition of his services in connection with ambulance trains and other important matters during the war he has also been appointed a member of the Order of the British Empire.

* * *

MR. K. PATON writes:—Sheds of the South-Eastern and Chatham Railway superheated 4–4–0's of Class L:—

Shed	2 (B'Arms)	772, 776, 777.
,,	3 (Cannon Street)	760, 763, 765, 773, 775, 779, 781.
,,	5 (Tonbridge)	762, 766, 769, 770.
,,	12 (Hastings)	764, 767, 768, 771, 774, 780.
,,	19 (Folkestone)	761, 778.

764 and 766 have been painted "war" black, but most of the class are green, with large numbers on the tenders.

The recently-reopened Bexhill branch is worked by 40, a Stirling 0–4–4 T retaining a domeless boiler. This engine worked on the branch before it was closed in January, 1917, when she was removed to B'Arms shed. The 8.50 a.m. Bexhill to Cannon Street is worked by one of the Hastings superheated 4–4–0's of Class L, which brings round the stock to form the train, from Hastings to Bexhill, early in the morning. She returns, after working the 8.50 a.m. up, on the 6.0 p.m. Charing Cross to Hastings.

* * *

AT Crewe Nos. 621, 707, 1,373, 1,453 and 1,584 are the first five of a new series of 4–6–0 "Prince of Wales" class engines, recently put in hand. Like the preceding batch, they will be turned out without names. The special tanks previously so numbered are now re-numbered 3615–3620 respectively. No. 303 *Himalaya* is the latest engine of the "Precursor" type to be superheated. It has 20½-in. cylinders and outwardly its appearance is the same as before. No. 1916 *Irresistible*, four-cylinder compound, has been converted to "Renown" class (two-cylinder simple). A further two four-cylinder compound mineral engines are being simplified and superheated, viz., Nos. 842 and 904. Several 6 ft. 6 in. 2–4–0 passenger engines have been broken up, including Nos. 304 *Hector*, 1673 *Lucknow* and 2184 *Reynard*. Other withdrawals are No. 57, 4 ft. 6 in. tank; No. 3189, special D.X. goods, and No. 3498, coal (ordinary). The two 0–6–0 engines of the Belgian State Railways, recently under repair at Crewe, were Nos. 2929 and 3079. These, it is understood, have now been returned.

* * *

EXPRESS train services on the French Northern Railway, which disappeared altogether when the German advance reached Amiens last spring, are gradually being restored, the number of fast trains leaving Paris daily having on March 1 reached eight or nine, in most cases with restaurant cars attached. The direct lines to Brussels *via* St. Quentin and to Lille *via* Douai were reopened on February 23, but over all the reconstructed sections a speed limit varying from 20 to 30 m.p.h. is still imposed, so that the best time from Paris to Lille (141 miles) is 5 hours (3 in 1914), and to Brussels (295 miles) 10½ hours (4 in 1914). The quickest train is the boat express to Boulogne, which covers the 82 miles from Paris to Amiens in 103 minutes, and the 77 miles thence to Boulogne Central in 114. There are several other runs between Paris and Amiens (or Longeau) in 1¾ to 2 hours, that is, at 40 to 45 m.p.h.

* * *

AT the fifth meeting of the fourth series of Efficiency Meetings held at the L.G.O.C. Training School, Chelsea, Mr. H. E. Blain, Operating Manager, presided over an attendance of over 200 members of the central staff of the associated undertakings. A paper, "Railway Maintenance—Civil Engineering," was read by Mr. Arthur R. Cooper, M. Inst. C.E., Engineer to the Underground Railways, and dealt in an exceedingly interesting and practical manner with the general organisation of the Civil Engineering Department; practice in regard to permanent way, illustrating types of track, rail fractures, sleepers and fastenings, sanitation and drainage, slips and pumps; electrical equipment of track, including notes on voltage, insulators, cable supports, &c.; signalling, including automatic fogging, lamp signals, speed control, and wireless installations; various types of railway works, including bridges, viaducts, the use of ferro-concrete, and general notes on station maintenance; lighting problems, such as the glare effect, variation in intensity, nature of surrounding surfaces, &c.; the ventilation of tube railways, with some interesting notes on temperature, the piston action of trains, &c., and a description of new works, such as the Earl's Court flying junction. The paper was illustrated with a large number of slides, and resulted in an interesting discussion, which was opened by Mr. A. R. McCallum, Chief Assistant to the Railway Mechanical Engineer, and Mr. H. L. Stollen, Maintenance Electrician, Engineering Department, L.G.O.C.

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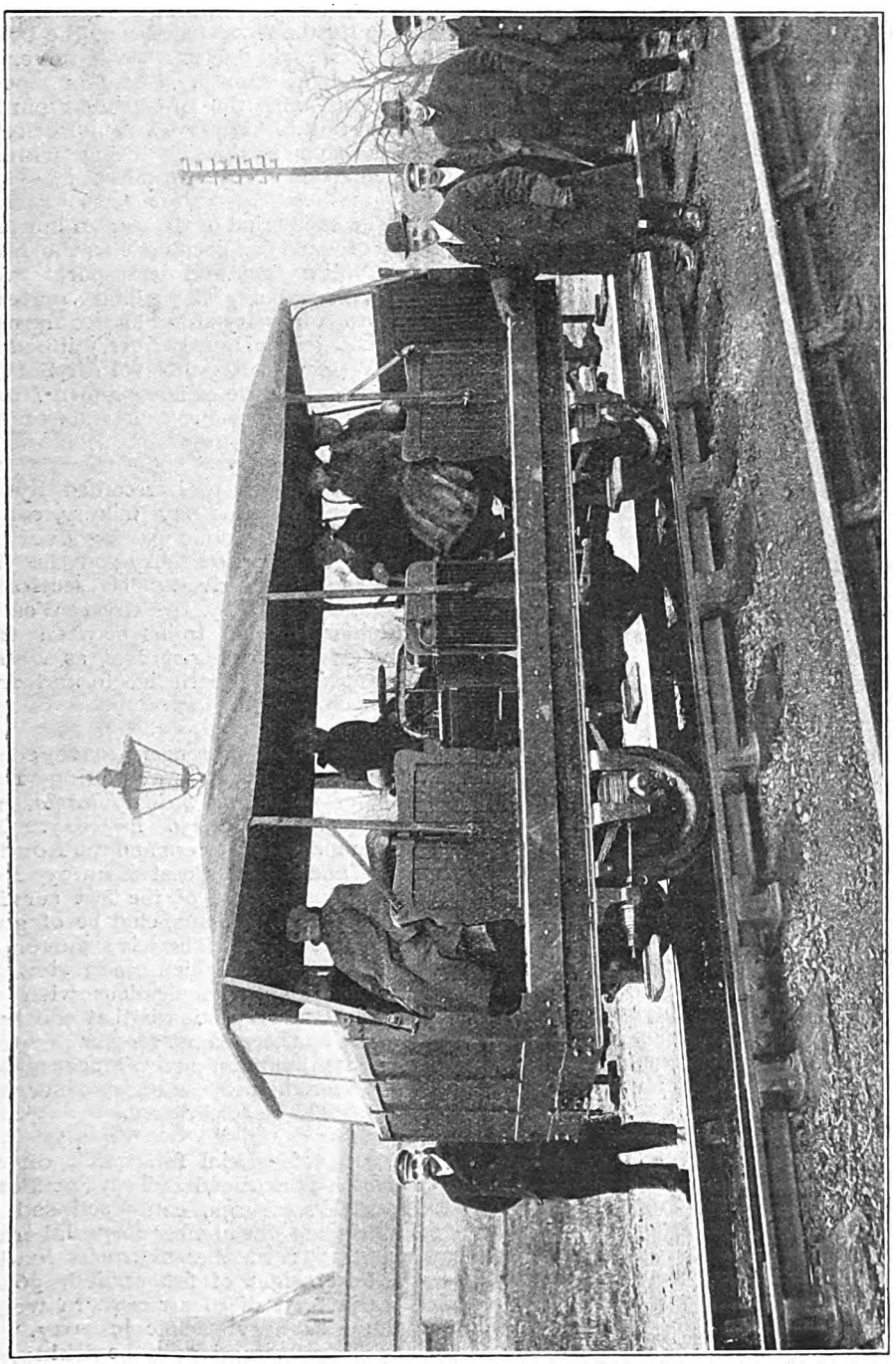

A NEW RAIL MOTOR INSPECTION CAR.

By courtesy of the Midland Railway the Motor Railroad Tramcar Company of Bedford were permitted to test two of their petrol rail inspection cars on the Bedford–Hitchin Branch.

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THE directors of the Glasgow Subway Railway Company have decided that, as an experiment, the fares shall be raised. The new charges would be 1d. per two stations, and 2d. for any greater distance than two stations, no fare less than 1d. to be accepted. In consequence of the reduction in working hours, the running of the trains is now started one and a half hours later on week-days and three and a half hours later on Sundays.

* * *

A VERY spirited defence of the single-wheel type of locomotive as opposed to the coupled express engine was advanced in the paper read by Mr. F. J. Vickery at the headquarters of the Railway Club, 92, Victoria Street, S.W. The subject is one that Mr. Vickery particularly has made his own, as many RAILWAY MAGAZINE readers are aware. Mr. W. Parker presided over an excellent attendance, and Mr. Vickery's address was followed by considerable comment, to which Mr. J. C. Cosgrave contributed no small share, including much illuminating information. At the conclusion Mr. Vickery was heartily thanked. At the same meeting three new members were elected. It was announced that the Committee had in hand a proposal to revive the Club annual dinner—a much-appreciated function in pre-war days—and it will probably be held on May 9. On Tuesday evening, April 1, there will be a general meeting of members at Victoria Street, when Mr. H. N. Foster will deal with the question of railway station design.

* * *

As will be seen from our advertisement columns the Stratford-upon-Avon and Midland Junction Railway offers exceptional advantages for factories or works on land adjoining, as there are large quarries of excellent building stone in the neighbourhood. The railway was promoted many years ago in order to develop the mining of iron ore in the districts served, and now that the Edge Hill Light Railway Order 1919, has received the confirmation of the Board of Trade, its construction is being proceeded with and it will serve a rich district. The land already acquired by blast furnace proprietors contains 8,000,000 tons of ore. There is a large quantity of rich ore-bearing land in the immediate vicinity available for extensions. The Edge Hill Light Railway will serve as a valuable adjunct and feeder to the Stratford-upon Avon and Midland Junction Railway. The Shakespeare Festival at Stratford-on-Avon, which has been suspended during the war, will be revived in April by Sir Frank Benson, and this should attract a large number of American soldiers and other visitors now in the country.

* * *

A CONTRACT has been let by the Caledonian Railway for the reconstruction of the bridge carrying the main line to Aberdeen over the River Tay at Cargill. Under a special arrangement with the Government part of the main line to Carlisle between Rockcliffe and Floriston stations is being widened for a length of nearly two miles.

* * *

DURING the period of the war an immense volume of trade has been done at the Barry Docks. Six thousand transports were loaded with coal, 227 with military material, 3,400 with Admiralty stores and equipment, and 26,000 tons of goods were shipped for Inland Water and Royal Naval Air Service, and over 30,000 tons of home-grown timber dealt with, besides many thousands of tons of hay.

* * *

STEADY development is recorded by the Rhondda and Swansea Bay Railway, especially in regard to traffic passing over the railway between Briton Ferry and the west side of the Neath river. This section is being largely used by the Great Western Railway for through trains between their main and Swansea district lines, as well as their Swansea and Neath line to and from Swansea.

* * *

THE number of passengers conveyed by the Isle of Wight Railway during 1918, *exclusive of naval and military traffic*, was 894,472, against 652,136 in 1917. The London and South-Western and the London, Brighton and South Coast Railway have already restored some of the fast services with Portsmouth, which should be of great benefit to the island. There is a movement on foot in the island which has in view the improvement of communications with the mainland. One suggestion is that the train ferry which has been in use for war purposes between Southampton and France should be secured for the purpose, and another that a tunnel should be constructed.

* * *

DURING 1918 special fish traffic on the Great North of Scotland Railway, at Peterhead and Fraserburgh, easily eclipsed all previous records, the number of special trains run being 579; number of trucks loaded, 12,555, and weight of fish carried, 36,470 tons—an increase of 59 per cent. in weight over the very heavy traffic in 1917. On account of the fluctuations in the fishing, the pressure on a single day was often very severe. For example, on Tuesday, July 2, at Peterhead and Fraserburgh no fewer than 525 trucks were lifted, and ran 17 special

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fish trains, in addition to a corresponding number of extra trains in the other direction with fishing plant, &c. This record was greater by 298 trucks in a day than the highest day's record in 1917—an increase of 131 per cent. In the goods department 168,000 more tons were carried than in 1917, the classes of traffic contributing principally to this increase being agricultural produce, timber and coal. Since 1913 the tonnage carried over this line has risen by 272,570 tons in goods alone.

* * *

It is officially stated that the Basingstoke and Alton Light Railway, closed early in the war, will not be re-opened, at any rate in its old form. This line was closed so that the whole of its permanent way could be sent to France for war purposes. Its length is 12½ miles, and it connected two sections of the London and South-Western Railway system. Traffic was mainly agricultural. Intermediate stations were provided at Cliddesden, Herriard and Lasham. Public traffic was inaugurated June 1, 1901.

* * *

By a special act passed in 1915, aggregate goods traffic receipts of the Metropolitan District, Central London, London Electric and City and South London Railways, with the London General Omnibus Company, Limited, are pooled and redistributed under specified conditions. For the year 1918 the total thus realised was £6,884,714 13s. 10d., while sources of revenue other than traffic brings the total to £7,743,451 1s. 2d. During the year it is estimated that 901,000,000 passengers were conveyed, exclusive of through inwards passengers from other controlled railways. Indeed, there were considerable increases in the numbers of passengers normally travelling, and there was a very large amount of military traffic using these lines for linking up various main line termini. On the three tube railways mentioned the numbers of passengers conveyed constitute records for any year since they were opened for traffic. Reference is made, in the reports of these companies to the directors' appreciation of the inconvenience and overcrowding to which the public has been subjected, but point out that this is inevitable as long as they suffer from shortage of rolling stock and insufficiency of staff. It is hoped that additional and improved rolling stock (some of which was ordered in 1914) will be available shortly and every endeavour is being made to obtain the early release of employees from military service. It is hoped that the work of enlarging tunnels on the City and South London Line, and other improvement works will be proceeded with very shortly. By arrangement the London Electric, Central London and City and South London Railways are dealt with for maintenance and operating purposes as one system, expenses being afterwards divided on an agreed statistical basis. The directors of the London General Omnibus Company, Limited, point out that their fleet of omnibuses has now reached such a state as to require complete renewal.

* * *

South-Eastern and Chatham Railway train alterations, taking effect March 1, include several items of special interest. The following stations have been reopened: —Bexhill, Sevenoaks (Bat and Ball), Crystal Palace, Upper Sydenham, Lordship Lane and Honor Oak. The High Level Station at the Crystal Palace and the branch line serving it has been reopened, and a good service of trains run between Ludgate Hill and the Crystal Palace. Main line services generally have been accelerated, from 10 to 15 minutes being saved on most of the trains between London and the coast. New fast trains include the following:—1.15 p.m. (Saturday only), Cannon Street to Ramsgate Harbour; 8.50 a.m., Bexhill to Cannon Street; and 9.5 a.m., Folkestone Central to Victoria. The 6 p.m., Charing Cross to Hastings, the 6.15 p.m., Cannon Street to Ramsgate Harbour, and the 7.45 a.m., Ramsgate Harbour to Cannon Street, trains have been altered in working, with the result that they reach their destinations approximately half an hour earlier in each case. A service of theatre trains leaving Charing Cross from 11.20 p.m. onwards, serving the principal outer suburban districts, is also provided.

* * *

Traffic on the Furness Railway was again very heavy last year, nearly 6,250,000 passengers being conveyed, compared with 5,500,000 during 1917 and 4,250,000 in 1913. The great increase compared with 1913 is almost entirely accounted for by the large number of workmen travelling, which necessitated running daily a number of additional workmen's trains, but last year the number of ordinary passengers increased by over 500,000 compared with 1917, although it was considerably less than the number conveyed in 1913. Goods and mineral tonnage was practically the same as in 1917, both figures being about 1,000,000 tons more than the tonnage in 1913. As regards goods traffic great assistance has been obtained from a system of train control, which was brought into operation on February 1, 1918. During 1918 eight additional engines and tenders, four built by Messrs. Kitson and Co., of Leeds, and four by the North British Locomotive Company, of Glasgow, were added.

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PROPOSALS are under consideration for the establishment of light railways in South Lincolnshire. The principal scheme is one for serving the marshes of South Lincolnshire by a line running from Spalding to Sutton Bridge, with a branch *via* Fosdyke to Boston. Another scheme is to serve the Crowland and Whaplode Drove districts, which are now isolated from railway communication. A further suggestion is a railway to serve the district north of Boston, linking up Butterwick, Freiston, Bennington, Leverton, Leak and Wrangle.

* * *

PASSENGER traffic will be recommenced on April 1 over the Southport and Cheshire Lines Extension Railway, between Southport (Lord Street) and Aintree, linking up with the Liverpool, Warrington and Manchester route of the Cheshire Lines Committees' railways. This section has been closed, except for goods traffic, during the war period.

* * *

COMMENCING February 18, and lasting until February 22, floods in the Lea Valley caused serious traffic difficulties, the Great Eastern Railway being mainly affected, including such vital points as Tottenham (Hale), blocking the Cambridge main line; Temple Mills, the chief marshalling yard of the London area; and direct access to the whole of the Woolwich lines *via* Stratford (Low Level) and Stratford Market stations. Loughton Yard (Leyton) was also affected, and at several places traffic had to be worked through varying depths of water. During part of the time the Temple Mills yards could not be used, and railway communication entirely interrupted at Tottenham, Stratford (Low Level) and Stratford Market. Traffic working was severely handicapped, and many special measures had to be taken. Principal access to the Woolwich line was *via* Bromley, Midland Railway, goods trains being worked during the night into Fenchurch Street Station for reversing to follow this route.

* * *

THE new Athy and Wolfhill Railway, constructed by the Great Southern and Western Railway, by arrangement with the Government, to serve the Queen's County Collieries, was opened for coal traffic on September 24, 1918, and a certain amount of coal has since been carried over it from the Gracefield Colliery. Subsequently the railway company was asked to carry out further works on behalf of the Government for facilitating the loading of the coal at the collieries, and these works, so far as the Gracefield Colliery is concerned, are now completed, and those at the Wolfhill Colliery will shortly be ready. In May last the Government further decided to provide a railway to serve the Castlecomer Collieries in county Kilkenny, and this line is under construction by a Government contractor, under the supervision of the railway company's engineer at the request of the Government.

* * *

DURING the past year there were conveyed over the Midland and South-Western Junction Railway 47,532 officers, 624,296 men, 11,966 horses, 190 vehicles, including guns and tanks, 7,706 tons of baggage, 1,578 troop trains, 332 ambulance trains, and 113 ammunition trains. Of the foregoing there were 9,708 American officers, 163,365 American men, 630 special trains, and 5,178 tons baggage. The total since August, 1914, runs into 181,683 officers, 2,992,202 men, 134,852 horses, 8,717 vehicles, including guns and tanks, 15,176 tons of baggage, 6,452 troop trains, 1,488 ambulance trains, and 8,984 trucks of ammunition. Following the signing of the armistice, Draycott Barracks, on this line, was selected for dispersal of troops, and between December 9 and February 19 120,000 officers and men have been dealt with, all involving use of this railway.

* * *

AT the recent London "Safety First" Council the Railway "Safety" Committee reported that its attention had been drawn to the danger arising from the emission of steam at railway bridges, the parapets of which are so low that smoke and steam are freely blown into the roadway and traffic thereby obscured. At the suggestion of the committee it was resolved to invite the railway companies operating in the metropolis, in cases of railway bridges abutting upon heavily-trafficked thoroughfares, to give consideration to the erection of baffles in proximity to parapet walls, or to take such other measures as may be deemed advisable.

* * *

THE Metropolitan Railway announces that the Ruislip Manor Station, which has been closed during the War, will be reopened for traffic on the 1st April. This Company has already commenced running two additional through trains to Baker Street and City stations, leaving Rickmansworth at 11.2 a.m., and from Chorley Wood and Chenies Station at 2.16 p.m.; also an additional train from Wembley Park at 1.28 p.m. to Chorley Wood and Chenies, connecting with the 1 p.m. train from Baker Street Station. For the convenience of theatre goers the train leaving Baker Street at 11.15 p.m. for Harrow and all stations thence to Aylesbury on the Extension Line now departs at 11.30 p.m.

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THE RAILWAY MAGAZINE.

RAILWAY STATION ADVERTISING.

The new North Eastern Railway Scheme for improving the appearance of stations.

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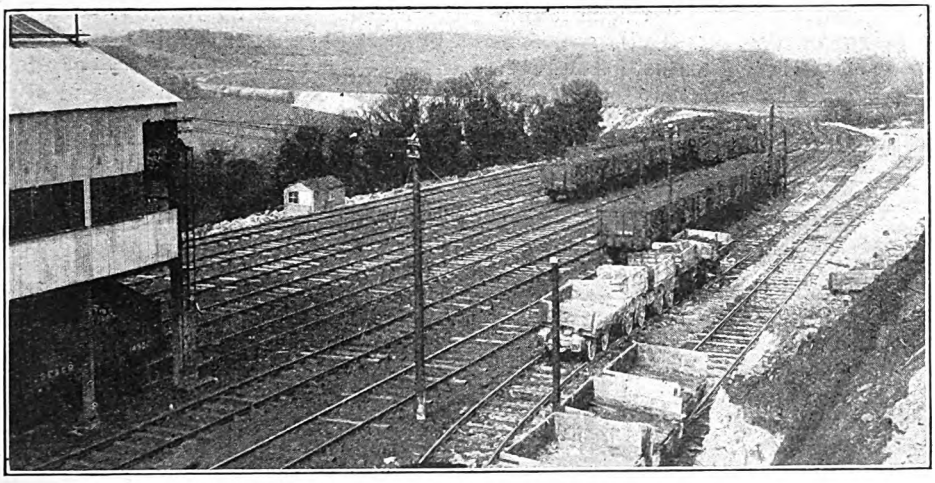

SIDINGS AT TILMANSTONE COLLIERY.

The East Kent Railway and its Traffic.

By W. C. GENTRY.

SOME years ago an article appeared in the RAILWAY MAGAZINE on the subject of the East Kent Light Railways, the construction of which was just commencing, and as, notwithstanding the war, great progress has been made in connection with this system, a description of the line as it is to-day will doubtless be welcomed.

The East Kent Light Railways Company was incorporated by Order of June 19, 1911, for the purpose of constructing a system of railways in Kent connecting the various collieries of the new Kent coalfield with the South Eastern and Chatham Railway and also with the waterside at Sandwich. The work was at once proceeded with and at such a speed that at the first general meeting of shareholders held at Dover on November 27, 1912, the chairman was able to announce that portions of the line were already in use. Several further extension Orders have been obtained and the system, as now constructed, extends from Shepherd's Well Junction on the Faversham-Dover section of the South Eastern and Chatham Railway to Wingham Colliery, with a loop line from Eythorne to Tilmanstone Colliery rejoining the main line a short distance beyond the colliery. A branch also extends from Eythorne to Guildford Colliery near Coldred, and others from Eastry to Hammill Colliery and from Wingham Colliery Station to Wingham Colliery. Between Eastry and Sandwich the line is laid, but is not yet open for passenger traffic, and a further length of line exists beyond Wingham Colliery through Wingham Town towards Stodmarsh. This latter line will ultimately reach Canterbury, a distance of only 5½ miles, and work on this important section is proceeding. In addition to the lines mentioned, further extensions are authorised from Eythorne to Mongeham, Coldred to Stonehall, and from Coldred to Maydensole (near Martin Hill). Authorised lines include the following:—Mongeham-Deal; Hammill and Snowdown Colliery; Coldred to Lydden and Alkham, about three miles from Folkestone, and near the outlet of the proposed Channel Tunnel, to which access can be secured.

Passenger traffic was commenced in October, 1916, between Shepherd's Well

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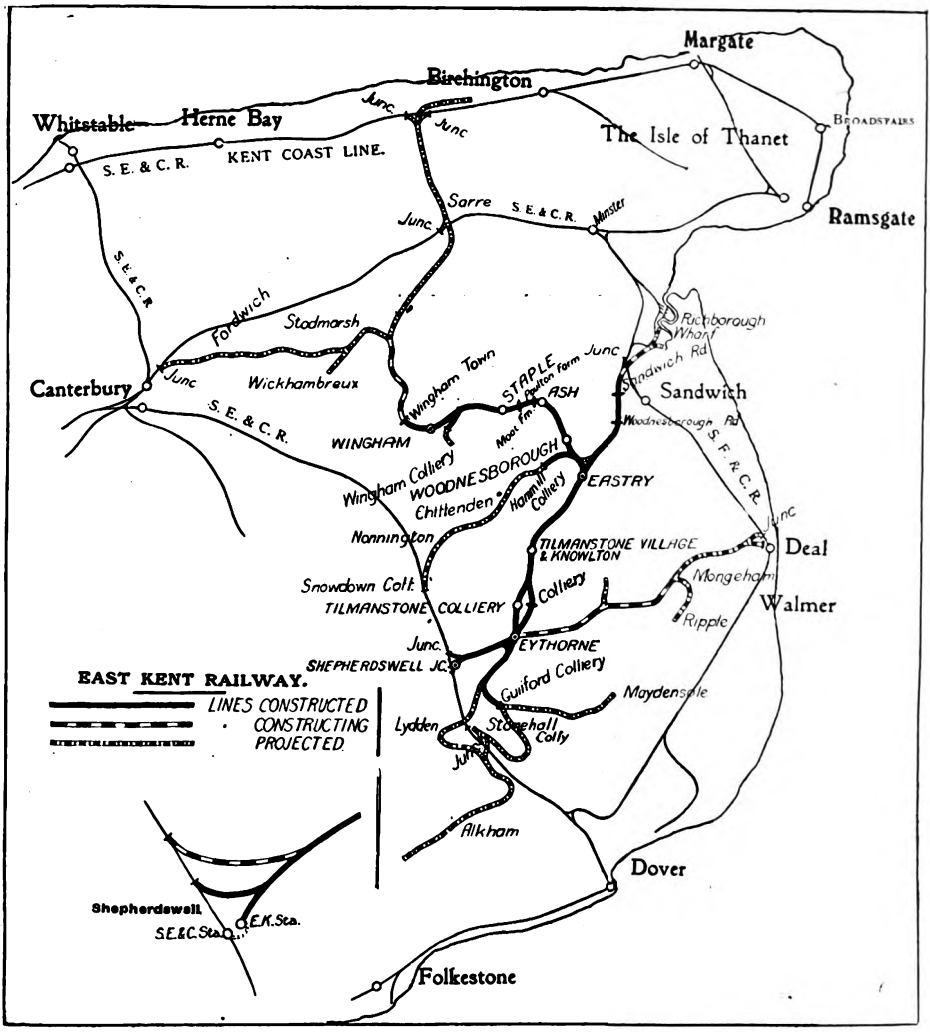
and Wingham Colliery, intermediate stations being opened at Eythorne, Tilmanstone Colliery, Tilmanstone Village and Knowlton, Eastry, Woodnesborough and Hammill Colliery, Ash Town, and Staple and Wingham Colliery, a distance of 10¼ miles; an extension to Wingham Town is nearly ready for opening. The total length of lines constructed is about 19 miles, the total authorised system extending to over 65 miles.



SKETCH MAP SHOWING EAST KENT RAILWAY AS CONSTRUCTED, IN PROGRESS AND PROJECTED, AND ITS CONNECTION WITH THE SOUTH EASTERN AND CHATHAM RAILWAY.

The country through which the lines pass is very undulating with a general slope towards Sandwich. At Wingham the line is about 20 ft. above sea-level, whilst at Shepherd's Well it has reached 300 ft. The gradient is, however, downward from both Tilmanstone and Guildford Collieries. When the proposed lines to Birchington and Richborough fructify, the load will be on the down-grade all the way from the Woodnesborough and Wingham Collieries to the coast, where the altitude is only 8 to 11 ft.

As a result of the undulating nature of the country the line is, between Eastry and Shepherd's Well, partly on embankment and partly in cutting. Between

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Eythorne and Shepherd's Well a double line tunnel, about a third of a mile in length, has had to be cut through Golgotha Hill. An illustration of the mouth of this tunnel is reproduced. The section from Eastry to Ash and Wingham, as well as the extension of the main line to Sandwich, is mostly on the ground level, the former following the valley of a small affluent of the Lesser Stour River. The line is worked as a single one on the staff and ticket system, although there are short sections of double track in the vicinity of Eythorne and Eastry Junction, which are passing places. Sufficient land has, however, been taken to double the line when the traffic should warrant this development, and ample land for siding and storage purposes. Semaphore signals are used at Eythorne and Shepherd's Well but not between Eythorne and Wingham. Telephonic communication exists between the stations, and the trains are block signalled by this method. The stations for the most part consist of merely a single raised platform of gravel or clinker with, in most cases, brick platform walls, bearing a name board but innocent of all station buildings, except at Shepherd's Well, Eythorne, Ash, Woodnesborough, Staple and Wingham, and even there only the most primitive erections suffice to serve present needs. There is no permanent station staff except at the places named. At Woodnesborough station two platforms have been built but only one is used at present for passenger traffic, the short length of track alongside the other being used as a goods siding. There are no level crossing gates on the line, such

LIEUT.-COLONEL H. F. STEPHENS, M.I.C.E.,
Engineer and General Manager, East Kent Railway.

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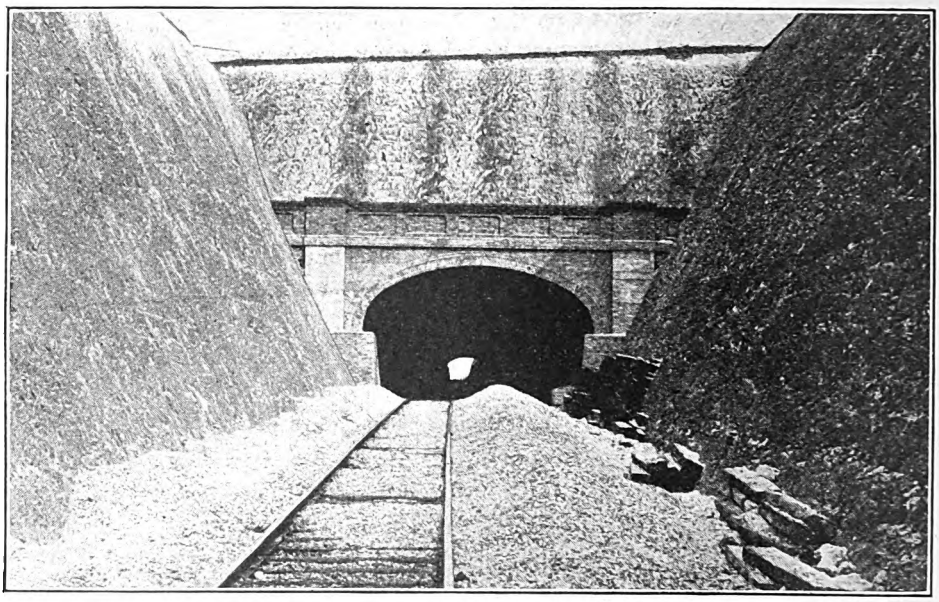

EAST KENT RAILWAY.
Golgotha Hill Tunnel, between Eythorne and Shepherd's Well.

crossings being protected by "cattle-guards." The only underbridge is at Eastry where the public road is crossed by a brick and timber single line erection. The permanent way consists of flat-bottomed rails fixed to the sleepers with fang bolts and spikes, the gauge being, of course, the standard 4 ft. 8½ in. The rails are 80 lb. per yard except on the heavy gradients where 90 lb. rails are laid.

Extensive siding accommodation has been provided at Shepherd's Well and goods sidings also exist at the principal stations. At Tilmanstone Colliery extensive gravitation sidings have been constructed, having a total length of three miles. A portion of these sidings are shown in the illustration on page 287.

Two private farm sidings have already been put along the portion of the line opened for public traffic and several others are asked for.

The passenger train service consists of three trains per week-day, each way, with additional early and late colliers' trains as far as Eastry, and the journey from terminus to terminus occupies 90 min., most of the trains being worked as mixed trains. The principal passenger traffic is between Tilmanstone, Eythorne and Shepherd's Well, but as time goes on, and the facilities offered by the Wingham line become more widely known, there is no doubt that a very fair increase in the number of passengers may be looked for. The line is of considerable interest to tourists, serving as it does a district steeped in history and containing many an ancient church and stately mansion. Close to Shepherd's Well are three large tumuli and an ancient camp. About a mile from Eythorne station is Barfreston (Barston) Church (1081) of Norman architecture, very richly decorated with carvings, &c. Waldershare Park, the beautiful residence of the Earl of Guilford, is also close to Eythorne. This mansion was erected in the reign of William III by Sir Henry Furnese, a monument to whom is in the church. The "Belvidere Tower" (in the park) affords fine views of the Channel and French coast Tilmanstone is the station for Betteshangar House, the seat of Lord Northbourne, an Elizabethan mansion with beautiful gardens and conservatories which may be visited by the public on Thursdays. Eastry is a village of great antiquity, and was once the residence of the Kings of Kent (A.D. 565). Many British, Roman and Saxon remains have been found in the district. Woodnesborough (Winsborough) is another im-

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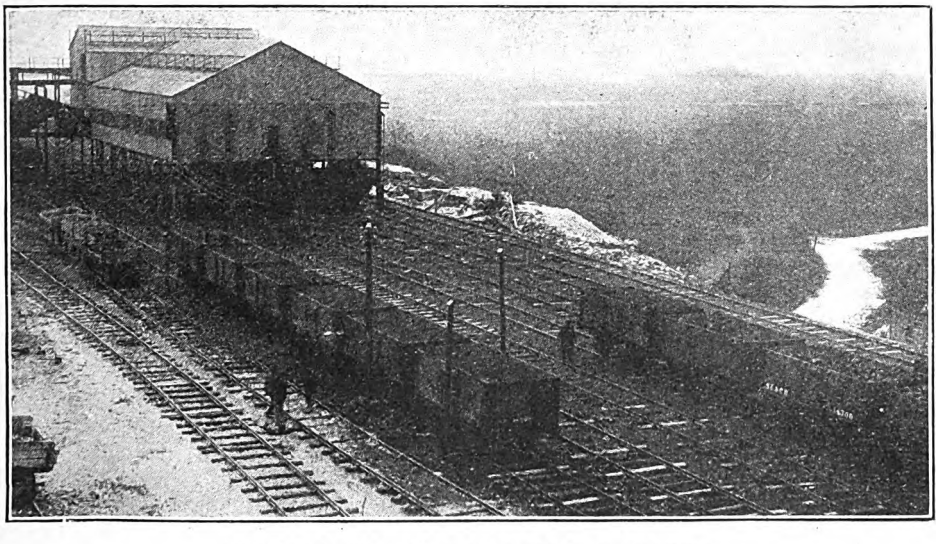
portant Saxon settlement which has yielded numerous antiquarian treasures. Ash is an important village with a prominent early English church and a fair sprinkling of good shops. Chequers Court, close at hand, is an ancient moated farmhouse. Wingham, the present terminus for passengers, is notable for its church and ancient houses, remains of the College of Canons, founded in 1286 by Archbishop Peckham. It is principally notable to-day as containing the large Margate Corporation Waterworks. The towns of Canterbury and Sandwich which will also be served by the new line are too well-known to require a recapitulation of their historical associations here. From the foregoing it will be seen that the district served by the East Kent Railway is one which will well repay a visit by tourists sojourning in Dover, Sandwich, Canterbury, Deal, Margate, &c.

It is the mineral traffic that is most important however to the new line, and to those who are still sceptical as to the existence of coal in Kent the sight of the large number of coal wagons in the Tilmanstone sidings should prove a valuable object lesson. The rolling stock of the East Kent Railway consists of four locomotives, five passenger vehicles, and thirty goods vehicles. When the writer travelled over the line recently the passenger train consisted of one composite compartment carriage and one composite (first and third) vehicle of a tramcar design with a through corridor connecting the guard's compartment with the rest of the vehicle. Tickets are issued on the train by the guard. The locomotive was a 14 in. 0-6-0 saddle tank, named *Walton Park*. Working at the colliery was also a powerful 0-8-0 side tank locomotive bearing name-plate *Hecate*. A third 13 in. 0-6-0 locomotive was not in steam at the time. This engine bears no name but is numbered "No. 1." There is also a 16 in. 0-6-0 tender locomotive, now No. 4, but originally No. 0394, London and South Western Railway, an old Beattie goods. With regard to the wagon stock, through traffic to points off the company's system is loaded either into the Colliery Company's wagons or into those of the South Eastern and Chatham Railway, being handed over to the Chatham section at Shepherd's Well Junction. The East Kent Company's wagons are only used for local traffic.

Dealing now with the prospects of the East Kent Railway, the writer found throughout the district and particularly in Eythorne (which threatens to shortly attain the dignity of a "town") the most optimistic opinions prevailing as to the future prosperity of the district as a result of the coal measures. It is quite possible that we shall have here a second Glamor-



COAL SCREENS AT TILMANSTONE COLLIERY.

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gan and the East Kent Railway may become a second Barry Railway. Seldom has a light railway been constructed with such excellent prospects. The coal traffic which, when the mineral area develops, will assume great proportions is, of course, the principal source of revenue anticipated; and when the four collieries already started are in complete working order they are estimated to produce at least 10,000 tons per day, and the task of distributing this will fall mostly on the East Kent Railway, who will thus carry over 3,000,000 tons per year, or about the same coal tonnage as is now carried over the entire South Eastern and Chatham system. At the inception of the line the promoters in dealing with the possibilities of traffic in passengers, goods and minerals, estimated a net £70,000 of traffic on a capital of £300,000. The Tilmanstone Colliery is at present working in coal, whilst Guilford Colliery is within 300 ft. of coal. At Woodnesborough and Wingham Collieries all surface buildings, engine houses, &c., are erected. That the East Kent Railway is not entirely a coal-carrying line is evidenced by the fact that at the Wingham end rapid progress is being made with the extension of the line to give access to the extensive works of the Wingham Engineering Company, and it is hoped that the near future will see this connection completed.

A port is the natural "corollary" of a line dealing in such a traffic, and the East Kent Railway has carried its rails near the River Stour at Sandwich, within a mile or so of the sea, and here docks and wharves can be readily constructed. An important Extension Order applied for in May, 1914, referred to powers for a new line from Wingham to the North Sea at Birchington with powers for the "... construction, maintenance, purchase or leasing by the company of wharves, quays, jetties, basins, sidings and works upon such lands . . . of the company together with all necessary buildings, machinery, works, tramways, ropeways,

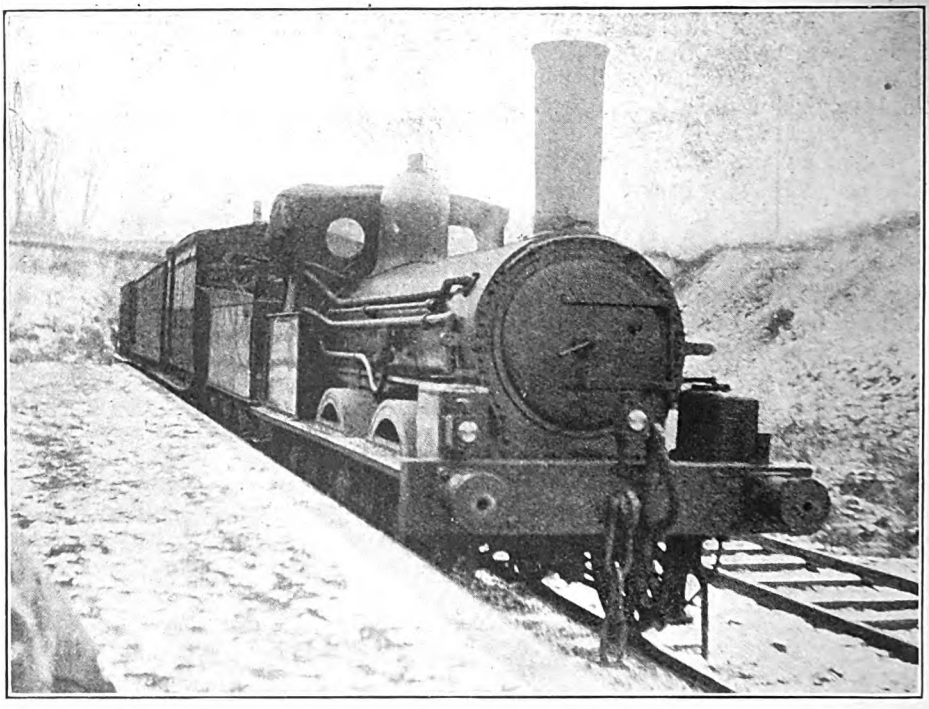

Photo.] [*K. A. C. R. Nunn.*

WOODNESBOROUGH TRAIN AT SHEPHERD'S WELL.
0-6-0 Engine. No. 4—previously No. 0394, London & South Western Railway.

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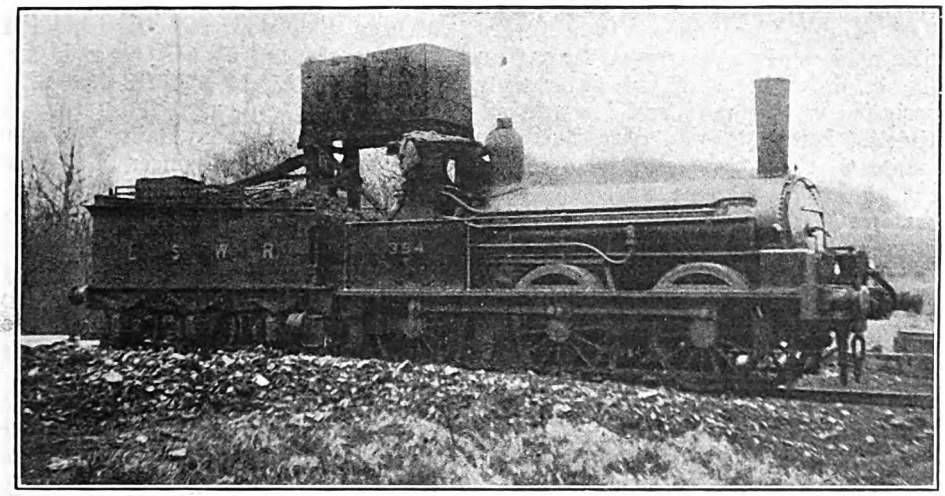

Photo.] [*K. A. C. R. Nunn.*

"BEATTIE" 0-6-0 LOCOMOTIVE, LONDON & SOUTH-WESTERN RAILWAY.
Now No. 4, East Kent Railway.

approaches and conveniences connected therewith. And to charge dues and tolls. . . ." The visions conjured up by this scheme include complete transformation of East Kent and the Isle of Thanet, and the dawn of an increased prosperity in which the entire South of England will share. Not the least important item in connection with the development of the Kentish coalfield will be the housing of the workers and their families. Several villages have already been erected for their accommodation at Stonehall, &c., and it is estimated that ultimately a total population of over 150,000 persons will have to be dealt with.

The total coal tonnage originating on this small line in 1915 was 15,886 tons; 1916, 70,898 tons; 1917, 132,275 tons; and in 1918 129,604 tons, the small reduction being due to shortage of labour arising out of war conditions; a total of nearly 350,000 tons carried during the war period. A silent reply to the loudly-expressed statements many times made by prejudiced parties and also by certain railway magnates, who should have known better, that there was no workable coal in Kent. The figures quoted further prove that the East Kent cannot be included in those railways referred to by Sir Eric Geddes in his House of Commons speech, March 17 last, as one of a class of lines constructed for no purpose and under no competent adviser.

Formation of a great new port at Richborough, near Sandwich, is now common knowledge, and it is interesting to note that at the time of the promotion of the East Kent Railway Company, the area between Sandwich and Ramsgate was merely a waste of marshland, through which the River Stour followed a remarkably devious course. The possibilities of this district and the Stour as a coal shipping port were noted by the promoters of the East Kent Railway, who obtained powers to carry their line to the waterside north of Sandwich and to construct there a wharf, &c., at the same time acquiring the derelict length of railway laid down many years ago by Messrs. Pearson (from the South Eastern and Chatham Railway to the riverside wharf) in connection with the Admiralty Harbour Works then being carried out at Dover. Before, however, this development was commenced, the war broke out and the Government decided to utilise this site for the construction of a military and train ferry port. A remarkable and rapid transformation took place and what was once a desolate marshland is now, to all appearances, an important and busy seaport. At the end, of February last the military control ceased and the management of Richborough (as the new port was called) was handed over to the South Eastern and Chatham Railway, who now maintain it on

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Behind the Front in France.

By P. C. L.

SERVICE in France provided many compensations for dangers and discomforts incidental to war conditions, and for those interested in railways not the least was the opportunities afforded for studying the French railway systems during periods of rest or leave. The writer had rather exceptional opportunities of travelling, hence this article. Perhaps it will be best for purposes of description, to divide the "line" into "fronts," dealing with the railways concerned on that basis, and substantially in accordance with conditions which obtained in March, 1918, as set forth on the map reproduced.

1. The first front of which the writer had experience was the northern portion of the line. For railway purposes this may be said to extend from north of Ypres to Lens, its main artery running from Boulogne and Calais to St. Omer and Hazebrouck, thence diverging in several directions. At Boulogne the Gare Maritime, with all its peace-time holiday legends, was not in use; consequently there was a journey, on arrival, on foot along the quay-side to Boulogne (Ville) station. One had to be careful to avoid an old Nord 0-8-0 shunting tank engine which was invariably working outside the Ville station where the dock lines crossed the road. The station was operated in two parts, the main portion used for what civilian trains there were (these, though few, were long and crowded), and alongside a military station. Here was to be found a troop train composed of coaches from every system in France, and not their best specimens at that. Another feature of Boulogne was the number of 2-6-2-Baldwin saddle-tanks (illustrated in the March RAILWAY MAGAZINE). They were numbered between 1500 and 1600 R.O.D. On leaving Boulogne, the train crossed the magnificent viaduct over the Liane, and after a rather dull journey reached Fontinettes, a suburb of Calais.

Calais (Ville) station was used only for civilian traffic and such soldiers as were lucky enough to obtain passes for civilian trains, but Fontinettes was a bewildering mass of supply and troop trains. An interesting point noted was the presence of several Belgian State railway wagons, although the writer never saw a locomotive of that railway. Several locomotives of the Nord-Belge system, however, were observed at different points, notably on the line between Hazebrouck and Poperinghe. At Fontinettes, two lines proceed further to Dunkirk and St. Omer respectively. Each had a separate platform, and it was a sad memory of more peaceful days to see the latter line marked "Lille," that town being then well behind the German lines. Leaving Fontinettes the railway continued through dull flat country, with no point of interest until Audriacq was reached. Here was an enormous locomotive yard, and one wished that the train would go slowly. But, alas! only a passing glimpse was vouchsafed, and the bare fact noted that N.E.R. and G.C.R. locomotives were there in numbers.

St. Omer was a more favourable place for railway observation. In the first place one had to violate all British sentiment and descend *on the track*. At first the traveller in France has visions of penalties "not exceeding forty shillings"; but, later, familiarity breeds contempt, and the temptation is to perform these feats in England on his return. At St. Omer were six very ancient Nord engines with *square* funnels. How one longed for the forbidden camera! Store trains kept passing through, drawn by N.E.R. 0-8-0's and G.C.R. goods locomotives. Either these were in France in great numbers, or else the writer was haunted by them, because they turned up everywhere.

A short distance beyond St. Omer a line branched off to the right to Arques, where it divided into two branches, one returning to Boulogne *via* Lumbres and Hesdigneul, and the other proceeding to Aire, Lillers and Béthune. Continuing from St. Omer along the main line, Hazebrouck was reached—a great centre

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of traffic. Straight ahead was the main line to Armentieres (and Lille); to the right, another branch to the Béthune area joining that from Arques at Berguette; while, to the left, was an independent line, not part of the Nord system, which served Poperinghe (and Ypres). This was one of the "compagnies diverses se rattachant au Nord" which are a feature of the Nord, as of all the great French systems. These are generally narrow gauge railways which tap local traffic at small cost. The Ypres-Hazebrouck line happens to be of standard gauge, but those from Calais to Anvin and from Aire to Berck-Plage are metre gauge. The last station in France along the Ypres line was Godewaersvelde—a wonderful name generally converted by the soldiers into "God knows where." Abeele—the first Belgian station—was damaged, while Poperinghe was nothing but a mixture of ruined walls and sheds. Two civilian trains a day ran each way on this branch, leaving Poperinghe at 6-18 and 13-26 and Hazebrouck at 9-56 and 16-36.

Although "Pop" was the chief rail head, there were numerous others as railways spread out fan-wise from Hazebrouck, and one found railheads of greater or less degree anywhere about 4 miles from the front. One in particular was at a place nick-named "Dirty Bucket Corner," and it was very quaint to see the station marked by two sign boards bearing the legend "Dirty Bucket." Another of these subsidiary lines was regularly worked by two L.N.W. 0-6-0 engines, and, as the chairs of the track were stamped L.Y.R., one might have been in the North of England.

2. The next portion of the "line" is that which centres in Arras. The passenger from Boulogne proceeds as before, but instead of crossing over the Liane, follows the main Paris line as far as Etaples, 12 miles away. What with hospital trains bound for Rouen, etc., from the northern front, and all kinds of military trains from the channel ports to Arras and Amiens, besides a fairly heavy civilian traffic, this was probably the most congested piece of line in France. Even the best trains took well over an hour to do the 12 miles. At Etaples, however, a large portion of the traffic was diverted to the left, along what had once been a peaceful country branch line, but was now one of the military trunk lines of the British Army. Passing Montreuil, the line reached St. Pol *via* Hesdin and Anvin. Interspersed with pastures and farms were aeroplane factories and tank parks, and other signs of the varied activities of modern war. At Anvin was the Southern terminus of the metre gauge line from Calais, which has connections with Aire, Boulogne and Berck-Plage. Besides the military traffic there was a heavy coal traffic on this section, which came down the two branches from Bruay and Béthune to St. Pol. The great Nord 4-6-2's were engaged in this work, and the loads they hauled must have been enormous. Military traffic on this line was dealt with mainly by engines of the 2-8-0 class of British or American make.

St. Pol was a most important junction. The Germans recognised this and shelled the junction in 1918, although it was 25 miles behind the front. It was also visited by hostile aeroplanes on most clear nights. Still, it went on being an important junction, albeit somewhat battered in appearance. In addition to the line from Etaples there met here lines from Bruay and Béthune (for the coalfields), also from Arras and Frévent; while at Frévent there converged lines from Abbeville, Doullens and Amiens. Consequently, there was quite a large civilian traffic at St. Pol. Seventeen passenger trains a day used the station in January, 1918, which was considerable for a station in the Pas-de-Calais in war time. Indeed, on busy days the appearance of the booking hall suggested an English provincial holiday. Beyond St. Pol, Ligny, Savy, and Aubigny were important military stations. At Aubigny, a metre gauge line from Lens (formerly) to Frévent crossed the Nord line. Thence the line ran to Arras.

Just outside Arras is a branch to Achiet (for Bapaume), Albert, and Amiens. This piece of line had a chequered career during the war. In 1914 it was closed, being partly held by the Germans. After the battle of the Somme it was freed and re-opened for civilian as well as military traffic. In 1918 it was closed again by enemy action, and now is probably open

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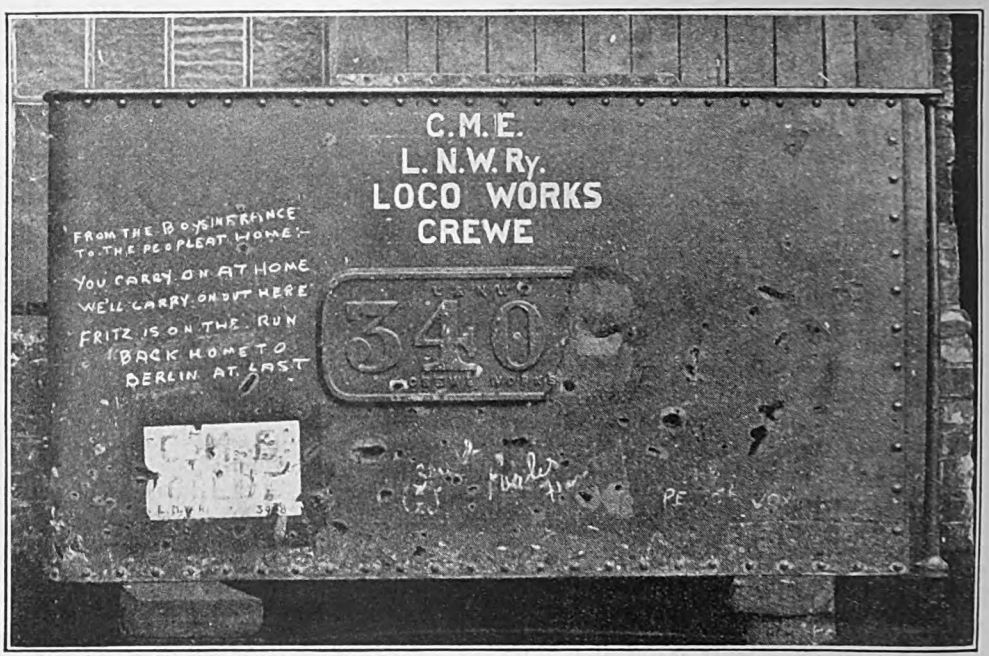
once more. In January, 1918, it ran parallel with the front, and much of the traffic from the coast to Bapaume passed over it, coming *via* St. Pol, Arras and Achiet, to Bapaume. It was extraordinary how the Nord Company adapted itself to the opportunities opened up. Naturally, there was little civilian traffic between Arras and Albert, but there was a large occasional military traffic, *e.g.*, men out for the day to Albert or Amiens, mess servants buying stores, or canteen men on the same errand. To meet this, the company printed special tickets at military fares to and from the stations on this line. Generally, blank cards were sufficient for such a purpose, but, in this case and some others the tickets were printed. The writer has in his possession a ticket of this character available from Albert to Achiet—one of a temporary series prepared for the use of the British Army. This line, south of Achiet, will be dealt with more fully later on.

3. Movement orders for the southern portion of the British front were often marked "*via* Amiens." From Boulogne, the main Paris line was used. It was not a very interesting section. After Etaples, was a long flat stretch, with the sand dunes on the right, as far as Abbeville, followed by another flat stretch up the Somme Valley to Amiens. After March, 1918, this line from just north of Amiens for some distance south was dangerous, owing to the proximity of the Germans, and it became necessary to divert the Paris-Calais traffic. Consequently, civilian trains ran from Boulogne to a point just outside Abbeville, thence to Le Treport Mers over a branch. Here they reversed and ran to Paris, *via* Abancourt and Beauvais, the best train from Calais taking 11½ hours for the journey, instead of the former 8 hours.



A MESSAGE FROM THE "FRONT" PER LOCOMOTIVE.

Photograph reproduced shows a side panel of a London and North Western Railway 0-6-0 engine returned from the Western front to Crewe for repair. The engine had manifestly been in the war zone. Soldiers at the front had taken the opportunity of sending a message to workers in the shops at Crewe.

Before this, however, it was to Amiens that the line from the southern British bases came. Traffic was carried over the State railway from Le Havre as far as Rouen. It is to be noted here that the

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State railway company, in numbering their locomotives, also denote their class, the class being determined from the number of "pairs" of wheels. Thus, No. 231—034 means engine No. 034 of the class 2-3-1 (*anglice* 4-6-2). The Nord company merely denotes the number of pairs of driving wheels, *e.g.*, 2-741, *i.e.*, No. 741, which has two pairs of drivers. The Nord branch from Rouen to Amiens was another line which came into prominence through the war. Leaving Rouen the train climbs a steep bank to Darnetal, and traverses a fairly heavily wooded country until the junction with the State railway from Dieppe is reached at Serqueux. Thence to Abancourt and the great military sidings at Romescamps. The last-mentioned was a mass of sidings, and if one entered at one end it was never known when one would get out at the other. It was seldom less than a two hours' business. After Romescamps, the line runs through the same sort of country to Amiens, where it joins the Calais line at St. Roch.

Beyond Amiens, passengers for the extreme south of the British line travelled towards Laon, probably branching off to Péronne, while the rest would continue to Albert.

Until March, 1918, Amiens was certainly the metropolis of the war zone for British troops. There one could enjoy real civilisation for a day or two, whether one's tastes were architecture, books, amusement, or simply a good dinner. And Amiens station reflected this. There was always a holiday crowd of civilians and soldiers, and all trains to or from Amiens were invariably crowded. Services were given to Paris, Montdidier, Chaulnes (for Péronne), Albert, and Arras, Doullens, Boulogne and the north, Rouen and St. Omer en Chaussée. The line to Albert followed the main Paris route for a short distance, then branched off along one side of a railway "triangle" to what was formerly the main Paris-Lille line. The train passed through several villages till Corbie was reached—a flourishing little township until March, 1918,—15 kilometres from Amiens. Beyond this point the war came into evidence. At Méricourt, goods traffic was handled by men in khaki. Near Buire were stationed ambulance trains, beside a British hospital. Albert was then largely in ruins, but was quite half inhabited. The station was damaged, and the ruined cathedral, with its "leaning Virgin," was a landmark for miles round; otherwise, one had to look closely before the damage was apparent. Here, a metre gauge line runs in from Doullens, but was disused at this end, only the portion from Doullens to Varennes being in service. It was curious to see the narrow and standard gauges crossing each other, with one platform of the station set aside for the narrow gauge.

Proceeding further, Miraumont was reached—a mass of ruins. Here the writer once saw a fashionable gentleman, accompanied by a lady, descend on to the mud bank that did duty for a platform. What could this couple want? Was it to gaze on what had once been their home, or to visit the grave of a friend? It was rather pathetic to see the guard ask for their tickets in such surroundings, as though he were in a suburb of Paris—truly a survival of civilisation in the wilderness! From Miraumont, the line continues over the old battlefield to Achiet, where the short branch from Bapaume runs in.

May the writer conclude by a short quotation from his notes, written after March, 1918?

"In the beautiful weather of early March numerous sight-seers from Amiens and the civilised parts would run up to the desolate areas, perhaps to see places they had once known, perhaps for mere curiosity. On Sunday, March 10, 1918, I stood in the sun-light on the bridge over the station at Albert, and watched the 5.25 p.m. from Arras run in. It came along, drawn by a fussy little tank engine, with a happy load of French *poilus* on leave, British Tommies on an outing, women and children and staid gentlemen out for the day and now returning to Corbie or Amiens—as peaceful a scene as could be imagined. Little did they reck of the catastrophe which was to overwhelm them in eleven days. I often wonder where the members of that holiday crowd are now."

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

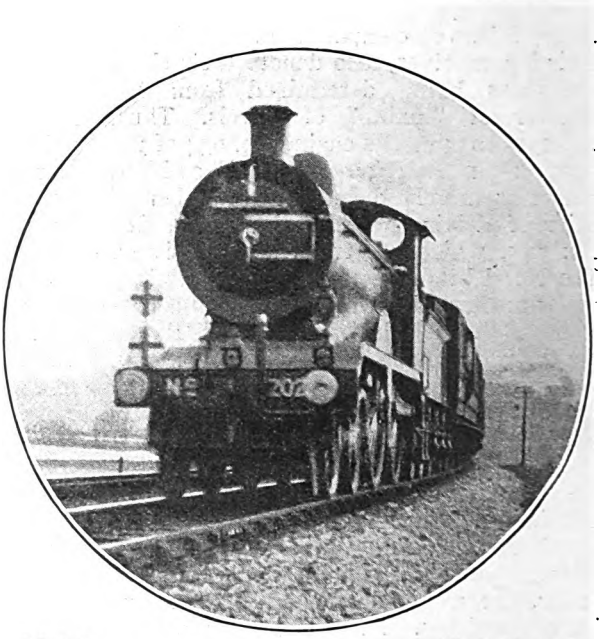

Photo.] [*W. G. Horton.*

LONDON, BRIGHTON & SOUTH COAST RAILWAY.
Hastings–London Bridge train near Lewes.
Rebuilt 4–4–0 Locomotive, No. 202.

BEFORE dealing with some further possibilities in the way of schedules for "limited" expresses in Great Britain, I wish to quote several letters which I have received from correspondents *apropos* of points discussed in the last three issues. The first of these brings into prominence a fact of great importance, which we are liable to overlook when wondering why the new trains now appearing in our time-tables embody practically no acceleration over the dismal running times of the worst war period, or when we are at a loss to explain the reason for some particularly deplorable sample of performance, such as is by no means uncommonly met with to-day, even on present schedules. It concerns the condition of our locomotive stock generally, after 4½ years of inadequate maintenance.

"The engines here," my correspondent writes—obviously I must suppress all the names in his letter—"are taken out by the men in fear and trembling. Wheels with broken treads and spokes are not uncommon. One engine I saw the other day had at least ¼-in. play between the cross-head and the guide bars, and at the beginning of each stroke the cross-head gave the guide a distinct blow. The nut on the end of a piston-rod worked loose on one of the four-cylinder engines starting away with the 3.30 p.m. down a week or two ago, resulting in the cylinder end being knocked out. Only to-day a driver was telling me of his experiences on the 6 p.m. up goods from —— to —— the other night. Fire tubes were choked; the superheater was blowing out; blower and poker were going all the time; the boiler would not stand an injector on any up grade, with the result that several stops had to be made to get up steam; the fire-door bolt broke at ——, so that the door could not be closed; lastly, as a fitting climax, at ——, the fire-brick arch fell in. Needless to say, the men arrived at —— quite exhausted." Such a chain of mishaps as this is probably exceptional, but there is no doubt that the present average condition of British locomotives is likely to delay for some considerable period anything material in the way of acceleration.

My friend's letter raises another point

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that is worthy of comment. "One of the factors, to my mind, affecting your proposed schedules," he remarks, "is that of coal. So long as the well of the tender is supplied, there is no particular difficulty; but it is another matter when you have to get up on the back of the tender and shovel the coal forward. One of the disadvantages of many modern tenders is that they do not throw the coal forward automatically, as they are supposed to do." The writer then instances the work to be performed in this respect on the pre-war "Cornish Riviera Limited" express of the Great Western Railway. "In the old days," he says, "when the Limited but I do not think they would be likely to arise except on the longest non-stop runs, of which, in my opinion, we shall see but few in the future. At the same time they do foreshadow the fact that, if trains of this character were instituted, the engine crews concerned would have a right to demand and expect extra pay for the extra work and responsibility involved, which is all the more reason, in my opinion, why such facilities could not be provided without a supplementary levy on the "consumer."

The second letter, received from a chaplain in France, deals with a different subject. "With reference to your

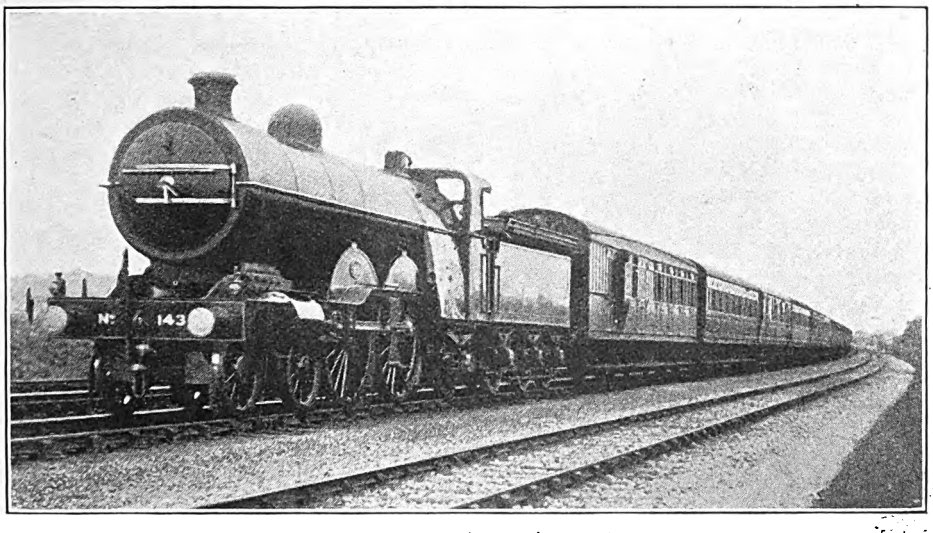

Photo.] GREAT NORTHERN RAILWAY. [*F. W. Curtis.*

King's Cross–Newcastle Express (N.E.R. stock) near Potters Bar. 4–4–2 Locomotive, No. 1433.

ran *via* Bristol, the 15 m.p.h. slack from Bristol East Depot to Pylle Hill gave an opportunity to get some coal forward, but at the speed you propose there would be little chance of doing so before Newton Abbot. Then would come the struggle up Dainton bank with a dirty fire, while in the descent of Rattery the curves during the first two or three miles make it all one can do to hold on, so that anyone going up on the back of the tender would stand a good chance of being thrown off. Obviously, engines running continuously at such high speeds would consume a good deal more coal than has hitherto been the case." These are practical difficulties, remarks as to the necessity of reduced speeds at such places as Weedon and Penrith," he writes, "would it not be possible, with a more pronounced cant of rail than is usual in England, to avoid such a reduction? On the main line of the French Northern Railway I do not remember, formerly, any reduction of speed at the S-curve on Caffiers bank, or through Etaples station, or at Breteuil. In particular, expresses used to pass Etaples in both directions at from 70 to 75 m.p.h., and, while I have no statistics, from a prolonged and leisured study of the station curve at intervals during the last four years, I wonder whether it is as

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sharp or sharper than those at Weedon and Penrith. English engineers do not seem to cant their rails on curves to the extent that is usual abroad." My correspondent then asks if I can furnish him with the radius of curvature of the curves he has specifically mentioned, as well as of the approaches to Menai Bridge, the curve through Wellingborough, and various other well-known curves in this country, for purposes of comparison. Unfortunately, I have not this information at my disposal, or I would gladly oblige him. I believe, however, that he is correct as regards the greater super-elevation employed on the Continent and in America than is common here. The development of scientific track-planning principles, such as the use of the transition spiral in laying out curves, has, however, proceeded further in those countries than here, where many improvements have been held up, owing to the limitations imposed by fixed structures adjacent to running lines, arising out of our limited construction gauge. At the same time, there would be difficulty in increasing the super-elevation of the main lines at a junction like Penrith, which is already considerable on account of the numerous connections to and from sidings and branches.

Finally, I have a letter from Belgium which merits attention. "In the days when the de Glehn compounds were making themselves famous on the Nord," it reads, "French speeds were better than British speeds. Since then, the former have gone back, while the latter continued to advance for a time and then became stationary." I cannot altogether agree with this somewhat dogmatic statement of fact, unless "French speeds" be taken to indicate the speeds of the best expresses on the Nord alone. The letter then proceeds: "Such a sight as an old man cutting the weeds in the 'four-foot' gives one furiously to think, but in both cases the prime cause of stagnation seems to be increased loading." Still less am I able to agree with this contention. In particular, I find it difficult to trace any connection between the increased loads of trains and the fertility of ballast. "Why, then," continues the writer, "this advocacy in the present dilemma of the Continental system of express train operation? Putting a premium on speed does not increase it, but makes it more rare. This policy seems to me to be mistaken and perilously reactionary; moreover, it ignores the real trend of events. Before the *débacle*, high speed was far more widespread in England than abroad, as witness

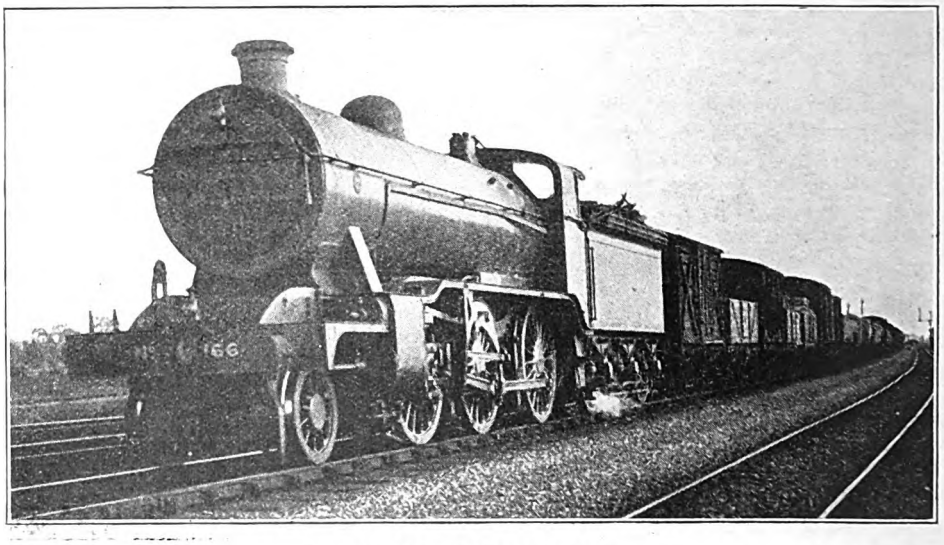

Photo.] GREAT NORTHERN RAILWAY. [*Chas. S. Lake.*

New 2–6–0 Locomotive, No. 1664, on down goods train near Sandy.

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the ' semi-fasts ' or short-distance *rapides*, which have always been a luxury peculiarly British. Taking individual examples, we have the Great Western Railway, once so aristocratic, gradually democratising itself and steadily working towards one class only, saving deadweight and combining speed with reasonable comfort for all. The G.W.R., however, was not alone; it was merely leading the way. We have third class dining cars, why not have third class sleeping cars and do away with first class altogether? Let us have third class for all, and instead of putting a premium on speed let us put a bonus on distance."

If ever my friend is fortunate enough to attain to any measure of affluence, there will probably be some modification of his views. It seems to me that, so long as there are any distinctions in our social order, there must of necessity remain class distinctions in our travel. The " bonus on distance " and the " high speed for all " have a Utopian sound about them, but again I would reiterate —and more strongly than before, in view of the serious financial condition of railways as revealed recently in Parliament by the Transport Minister-elect—that railways are not philanthropic institutions. If such a state of affairs as that outlined by my correspondent ever came into force under State ownership, it seems to me that it would almost inevitably involve, even under the most enlightened management, a heavy charge on the Exchequer to meet the operating loss involved; that is to say, those who do not travel would be taxed in order to provide comfort and celerity for those who do. In the past, the financial position of our railways has undoubtedly suffered heavily in that, under the stress of competition, they have improved travel conditions to such an extent that the " consumer " of travel has benefited out of all proportion to the reasonable expectations of railway servants and shareholders. Without the intention of being in any way " reactionary," I suggest that the equitable arrangement would be to continue existing travel gradations, and, in a manner similar to that in which any average business is conducted, that the cost of travelling should always be strictly proportionate to the facilities afforded. These views, it need hardly be emphasised, are an expression of purely personal opinion.

But I appear to be straying into realms of argument far removed from " British Locomotive Practice and Performance "; furthermore, very little space is now left in which to outline any further possible schedules of the future. There is just room, however, to deal with the Great Northern Railway, and its continuation by the North Eastern and North British Companies, as the East Coast Route, into Scotland. We will imagine our 250-ton *train de luxe* leaving King's Cross behind one of the superheater " Atlantics." Despite the heavy initial work out of the terminus, it should be possible to get through Hatfield, 17.7 miles, in 21½ min., *i.e.*, only 1½ min. under the previous standard time by almost all expresses; and if we attained 75 m.p.h. or more at the foot of the descent to the River Lea, and went " all out " for Woolmer Green bank, there should be no difficulty in breasting Hitchin, 31.9 miles, in 33½ min. As I have timed an engine of this type to cover the ensuing 27 miles to Huntingdon in 21 min. 40 sec. with a 450-ton trainload, an allowance of 21½ min. with 250 tons seems reasonable, and a further 16 min. over Abbot's Ripton " hump " into Peterborough would take us through the Cathedral City, 76.4 miles, in 71 min. Allowing for the severe slack through the station, we should probably not compass the ensuing 12.2 miles to Essendine in less than 12½ min., and I have allowed 13½ min. for the 11.5 miles from Essendine to Stoke Summit. With 5 min. for the 5.4 miles' smart descent to Grantham, we should get through this important Great Northern centre, 105.5 miles, in 102 min. From Grantham down to Newark, 14.6 miles, 11½ min. are allowed, and from Newark over Markham summit to Retford, 18.5 miles, 17½ min; total, 131 min., or 10 min. less than the schedule of the 6.10 p.m. down " Sheffield Special " in the days of its 170-min. non-stop run to Sheffield.

If our " Limited " were bound for the Cutlery Town, 2 hours 40 min. would be the minimum practical non-stop time from London, after taking into account the dead slowing through Retford, the slack at Woodhouse Junction, and intermediate cautions over colliery workings. If, how-

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ever, the Sheffield portion consisted of a couple of slip coaches off a five-coach Leeds and Bradford express, allowing for attaching a fresh engine at Retford and restarting, the total time would be 2¾ hours. The Midland and Great Central Companies would both find a difficulty in equalling this time with a corresponding load out of London. Meanwhile, our Leeds express, having passed Retford in 131 min., needs 16 min. for the ensuing 17.4 miles to Doncaster. If Leeds is to be reached in the even 3 hours, it would require a non-stop run throughout, over the 185.8 miles from London, and hard going in particular, even with a five-coach train, to run the 29.8 miles from Doncaster to Leeds, with their very heavy grades, in 33 min., but I believe it would be feasible. Bradford passengers would therefore either be slipped at Wakefield, and running thence by the direct line, reach their destination in 3¼ hours from London, or, if the same coach were detached at Leeds and run thence specially, 3 hours 20 min. would amply suffice for the total time.

As a stop at Grantham would hardly be necessary for any but locomotive purposes, I have assumed in the case of the Scotch *luxe* a non-stop run to York. The 18.4 miles from Doncaster to Selby would be run in 16½ min., and the remaining 13.8 miles to York, including recovery from Selby service slack, in the same time; total, 3 hours for the 188.2 miles, in this case with the full 250-ton load throughout. Four minutes would suffice for changing engines at York, and then, in charge of a North Eastern "Atlantic" of class Z, we ought to get away in good style over the level length to Darlington, passing Alne, 11.2 miles, in 12½ min.; Thirsk, 22.2 miles, in 21½ min.; Northallerton, 30 miles, in 28 min.; and Darlington, 44.1 miles, in 40 min. Allowing for the moderately adverse grades beyond Darlington we should need 13 min. for the 12.9 miles on to Ferryhill, followed by 10 min. for the succeeding 9.1 miles to Durham, with its service slack beyond Croxdale. In view of the bad slacks through Durham and Owston Junction, and over the approaches to the King Edward Bridge, it would not be possible to allow less than 15 min. for the final 14.4 miles into Newcastle, which would make a total of 78 min. for the 80.4 miles from York, and of 4 hours 22 min. from London. With four further minutes for changing engines, and a fresh "Z" in charge, we should then pass Morpeth, 16.6 miles, in 19 min. (the start out of Newcastle is adverse for 10 miles); Aln-

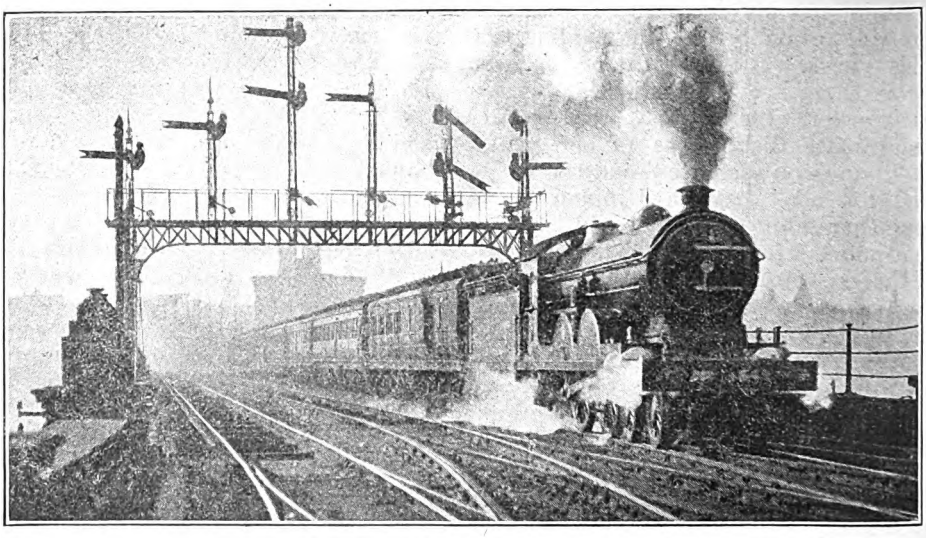

Photo.] NORTH EASTERN RAILWAY. [*Chas. S. Lake.*

Edinburgh–London Express on King Edward Bridge, Newcastle-on-Tyne.
4–4–2 Locomotive, No. 649.

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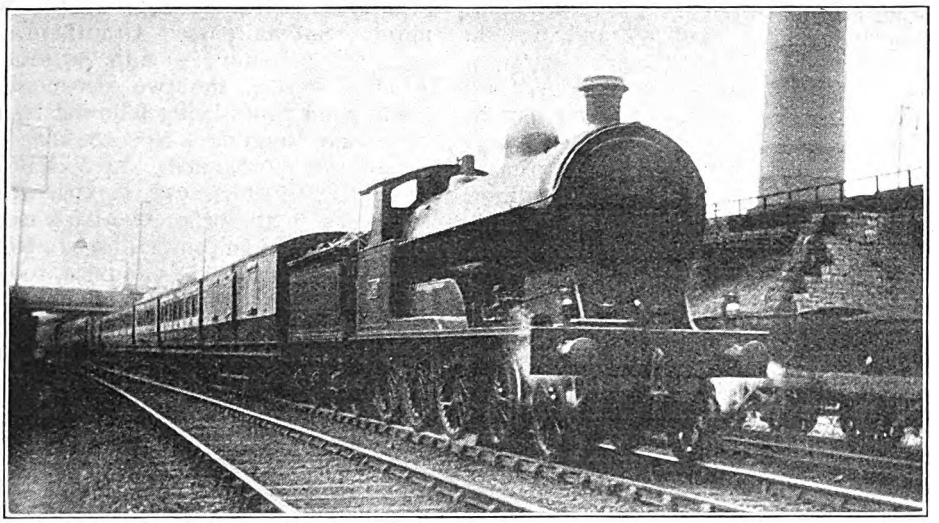

Photo.] LONDON & NORTH WESTERN RAILWAY. [*W. H. C. Kelland.*

Down Express passing Carnforth Iron Works. 4-6-0 Locomotive, No. 1388, "Andromeda."

mouth Junction, 34.8 miles, in 35 min.; and Berwick, 66.9 miles, in 64 min. For the steep 5.5 miles up to Burnmouth, after Berwick slack, I have allowed 8 min., with a further 13 min. for the 10.7 miles on to Grant's House summit. Thence down to Dunbar, 12 miles, would take 10 min.; Dunbar to Portobello, 26.3 miles, would occupy 25 min., and the final 3 miles into Edinburgh would be run in 4 min.; total, 124 min. for the 124.4 miles from Newcastle, and 6½ hours from London, 393.1 miles. In point of fact, there are at least 3 min. to spare between Berwick and Edinburgh, on the basis of a continuation of the effort south of Berwick, and these might usefully be retained as a "recovery margin" over this length, as already in force with the 10 a.m. down "Scotsman" from London.

But a truce to imaginings! It is high time to descend from the pedestal of speculation to the level of present-day fact, and I cannot do better than follow on with details of a few recent runs over the same route. It cannot be said that I have always, during the past few months, found Great Northern running so "unexceptionable" as described in the February issue, but I have certainly had a number of quite good trips. First of all, there were three on the Newcastle portion of the 1.30 p.m. down, prior to its permanent division into the 1.30 and 1.40 p.m. from February 1 last. On one of these three runs we had a 70-axle train boasting 1,064 seats, and as it was crammed with passengers, the 448 tons' tare weight must have been made up to a full load of quite 520 tons, and we were therefore piloted to Potter's Bar. No. 1402, superheater 4-4-2, was the train engine, and 4-4-0 No. 1080 the pilot. Thus provided, we passed Finsbury Park in the smart time of 7½ min., and reached Potter's Bar, 12.7 miles, in 21 min. 40 sec. Dropping the pilot here, we passed Hatfield, 5 miles, in 8 min. exactly, at 62½ m.p.h., fell to 42 at Woolmer Green, and were through Hitchin, 19.2 miles, in 24 min. 5 secs. Then we made quite a "pre-war" spurt, touching 76½ m.p.h. at Three Counties, only falling to 69 beyond Arlesey, and reaching 72½ at Biggleswade, so that the 15.6 miles from Hitchin to Tempsford were covered in 13¼ min. Sandy, 31.4 miles, was passed in 34 min. 20 sec., and Tempsford, 34.8 miles, in 37 min. 20 sec. Then followed bad signal checks at St. Neot's and Huntingdon, our time to the last-mentioned point, 46.2 miles, being 50 min. 10 sec.; and to Peterborough, 63.7 miles, 75 min. 10 sec.; but not more than 69½ min. net—an excellent piece of work. Our total time from London was exactly 98 min., or 5 min. inside schedule, despite the checks; including the Potter's Bar stop, it was about 92¼ min. net. On

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the next two trips, Nos. 1416 and 1404, both superheated, had 56 and 60-axle trains, weighing full 425 tons and 470 tons, and ran quite easily throughout. We passed Finsbury Park in 8¾ and 9 min. (being slacked in the latter case to pass through one of the suburban platforms); Potter's Bar in 24 min. 40 sec and 27 min. 10 sec.; Hatfield, 17.7 miles, in 30 min. 35 sec, and 33 min.; Hitchin, 31.9 miles, in 46 min. 35 sec. and 48¾ min.; and Sandy, 44.1 miles, in 57 min. 40 sec. and 60 min. 10 sec. Then followed a bad p.w.r. check at Tempsford, and in the former case, in addition, a severe signal check at Huntingdon; so we passed Huntingdon, 58.9 miles in 75¾ min. and 79 min. 5 sec., and reached Peterborough in 101 min. 10 sec. and 102 min. 5 sec.—95 and 97 min. net respectively, or 8 and 6 min. inside schedule.

Out of Peterborough, No. 284, superheater, had the hardest task with the 520-ton load; the 425-ton train was taken on by an engine of the same type, whose number I could not catch, and the 470 tons by No. 1406, also a superheater. Banked in the rear from the platform in each case, we passed Essendine, 12.4 miles, in 18 min. 35 sec., 17¾ min. and 17¼ min., and spent 20¼ min., 15 min. 50 sec. and 16½ min. respectively on the long climb of 11.5 miles thence to Stoke Summit. On the second run our lowest speed was 34 m.p.h., whereas No. 1406, slightly checked by signals, fell to 32 m.p.h. So we passed Grantham, 29.1 miles, in 45¼ min., 39 min. 55 sec., and 40 min. 5 sec., the two last-mentioned really good times being followed by some very easy running. No. 284 ran from Grantham to Newark, 14.6 miles, in 13½ min., touching 71½ m.p.h., whereas the times on the other two trips were 15 min. 10 sec. and 14 min. 40 sec. Newark up to Markham Box, 13.6 miles, took 17½ min. on the first run, with a minimum of 29½ m.p.h.; on the second and third we were badly checked by signal at Carlton and took 20 min. 40 sec., and 21 min. 20 sec. From Markham to Retford, 4.9 miles, consumed 6 min. 20 sec., 5 min. 20 sec., and 5 min. 55 sec.; and from Retford to Bawtry, 9.1 miles, 9 min. 40, 20 and 10 sec. Only No. 284 had a clear run into Doncaster, which town, 79.4 miles from Peterborough, was reached in 103½ min., or 4½ min. inside schedule time. Both the other trains were badly delayed in the last few miles, but their net times did not exceed 98½ and 99 min. respectively, the gains to engine in these cases being 9½ and 9 min. The only run worthy of comment beyond Doncaster was made by No. 1456, superheater, hauling 425 tons, as on this occasion we passed Templehirst, 13.8 miles, in 17½ min., at 62½ m.p.h., and reached Selby, 18.4 miles, after a very slow approach, in 23 min. 35 sec. Further,

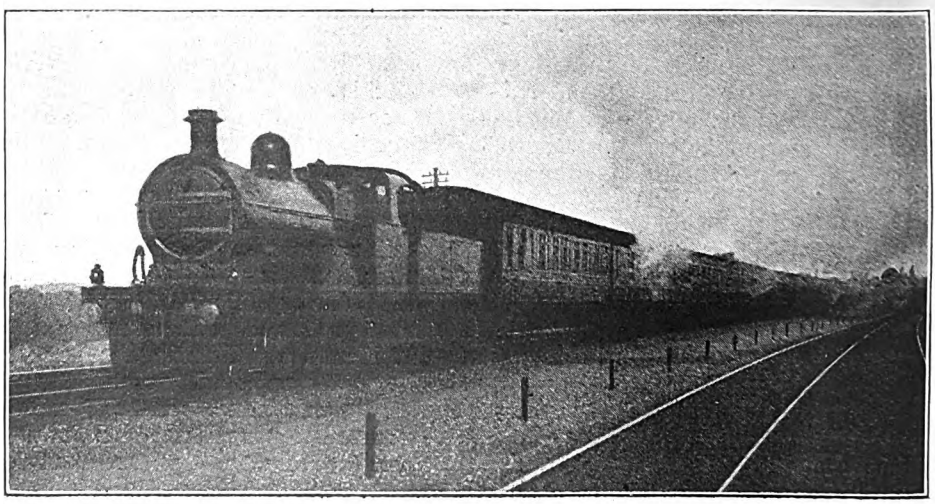

Photo.] MIDLAND RAILWAY. [*Chas. S. Lake.*

Up Leeds and Bradford Express near Oakley. Class 3 4-4-0 engine (Johnson type).

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we ran on to York, another 13.8 miles, in exactly 21 min., as scheduled, which was a good time, as the Selby start is distinctly difficult for an "Atlantic." Why, by the way, are the officials at Selby so exceedingly loath to part with the passing traveller? Our average period of halt on this train on five occasions works out at exactly 14 min. One would think it possible, now that York is a closed station, for the ticket-collecting staff to be concentrated there, rather than their being dispatched in various directions to contribute towards these inordinate delays at outlying stations. Since the Doncaster

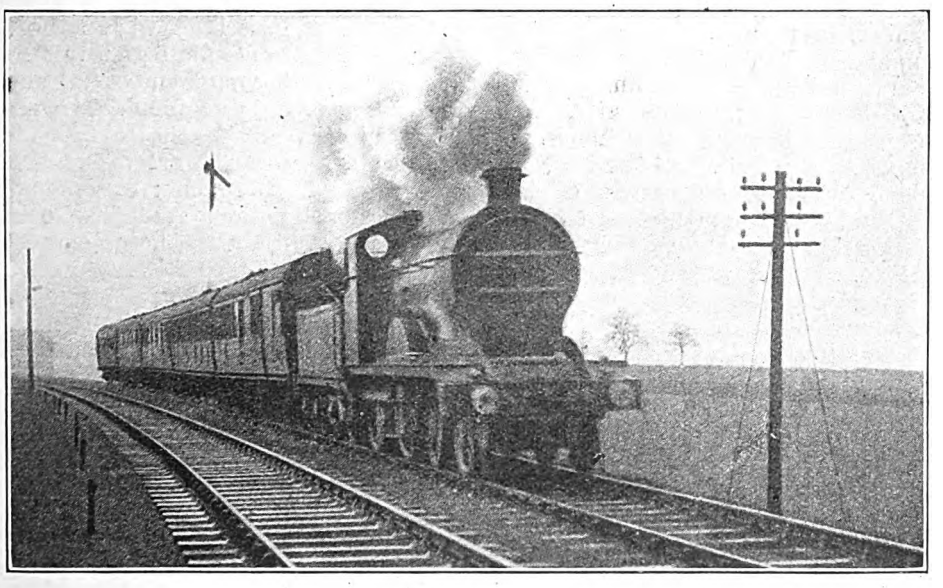

Photo.] HULL & BARNSLEY RAILWAY. [*K. A. C. R. Nunn.*

Sheffield–Hull Express near Heck Box. Large 4-4-0 Locomotive, No. 35.

stop has been cut out, the 1.40 p.m. *ex*-King's Cross has had its scheduled stopping time at Selby increased from 9 to 13 min.

On the latter express I have had a couple of excellent runs, which acquire their chief interest from the fact that the engine was in each case the converted four-cylinder superheater "Atlantic" No. 279. On the first we had a 60-axle train of corridor stock, and on the second one of 56 axles, weighing 413 and 386 tons empty, and 450 and 425 tons full respectively, the coaches being well filled. We were through Finsbury Park in 8 min. 50 and 5 sec.; Potter's Bar, in 26¾ and 25½ min. (at 28½ and 30½ m.p.h. respectively); Hatfield, in 32¾ and 31¾ min. (in the first case, at 67 m.p.h.); Knebworth, in 40 min. 50 and 20 sec.; and Hitchin, in 47 min. 45 and 25 sec. A maximum of 72½ m.p.h. was reached at Three Counties on each run, the 12.2 miles from Hitchin to Sandy occupying 11½ and 11¼ min.; after that, on the first run we experienced a p.w.r. check, and took 19¼ min. on to Huntingdon, whereas, on the second, our unchecked time was 15 min. 25 sec. Fletton Junction, 75 miles from London was passed in 95 min. 5 sec. and 92 min. 25 sec., and it was therefore evident that we could not possibly escape delay from the 1.30 p.m. down Leeds ahead of us, especially in the second case, when, with a little smarter running from Holme, we could easily have been into Peterborough at 3.13 p.m., *i.e.*, the time that the 1.30 p.m. is due to *arrive* there. It seems to me unfortunate, on this account, that the Leeds train has not been expedited to and from Peterborough (which is easily possible now that it has been lightened by the loss of the Newcastle portion), so as to avoid this constant delay to the 1.40 p.m. whenever the latter has made a reasonably good run from town. On the

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first of these trips we managed to get through Peterborough in 98 min. 40 sec., despite a bad check outside, or 94½ min. net; but, on the second, we were stopped dead for nearly 5 min., and took 101 min. 20 sec., or 93 min. net. Slight signal checks followed thereafter on both runs all the way up to Stoke, the 23.7 miles taking 37 min. 20 and 30 sec., and we reached Grantham in 142 min. 35 sec. and 145 min. 40 sec., inclusive of all delays. Schedule is 144 min.

On the first of the two last-mentioned journeys we were taken forward from Grantham by No. 1447, a superheated "Atlantic," on our 63-min. run to Doncaster (50.5 miles), and passed Newark 14.6 miles, in 17 min. 50 sec; Carlton, 20.9 miles, in 23 min. 40 sec.; Markham Box, 28.2 miles, in 32¾ min. (at 39½ m.p.h.); Retford, 33.1 miles, in 38 min. 40 sec.; and Bawtry, 42.2 miles, in 49 min. 10 sec. But for bad delays outside Doncaster our start-to-stop time for the run, which actually was 64 min. 25 sec., would not have exceeded the even hour. No. 283, not yet superheated, did even better on the second run, which was made subsequent to the deletion of Doncaster stop. We passed Newark in 17 min. 25 sec., at 69 m.p.h.; Carlton, in 23 min. 25 sec.; Markham, in 32 min. 50 sec. (at 39 m.p.h.); Retford, in 38¾ min.; Bawtry, in 48 min. 55 sec.; surmounted Piper's Wood "hump" at 40 m.p.h. exactly; and were through Rossington, 45.8 miles, in 53 min. 35 sec. Once again bad delays preceded Doncaster, and our possible time of 58½ min. was increased to an actual one of 61½ min. We met with further delays outside Selby, and so took 85 min. in all for the 68.9 miles; but I estimate the net time at 79 min., instead of the present schedule of 85 min. From Selby to York we ran in 21¼ min., or almost exactly as booked,

Several journeys on the 5.30 p.m. down must be held over until a future occasion, in order that I may deal with some trips in the reverse direction, where I have not been so fortunate in my experiences. Certain of the runs have been frankly poor, while others, which showed considerable promise in their early stages, were so cruelly afflicted with delays from preceding expresses as to lose all their interest. Two runs on the up Newcastle express, due at 2.15 p.m., were notable, however. On the first we had a 58-axle train weighing in all 390 tons, and left York 19 min. late. Selby, 13.8 miles, was passed in 19¼ min., speed here being eased to 45 m.p.h., and Doncaster, 32.2 miles, was reached in 42 min. 25 sec., instead of the 45 min. allowed. Cutting the regulation stop of 5 min. there to 4¼ min., we re-started 15¾ min. late, and passed Bawtry, 8.3 miles, in 13 min. 10 sec.; Retford, 17.4 miles, in 22 min. 50 sec.; Markham, 22.3 miles, in 29 min. 35 sec. (at 38½ m.p.h.); Carlton, 29.6 miles, in 37 min. 5 sec. (at 68 m.p.h.); and Newark, 35.9 miles, in 44¼ min., after a pronounced slowing over Carlton troughs. Falling to 35½ m.p.h. at Peascliffe, we ran through Grantham, 50.5 miles, in 64 min. 35 secs., and with a further minimum of 30½ m.p.h. at Stoke we passed the summit, 55.9 miles, in 73 min. 35 sec. Stoke to Essendine, 11.5 miles, consumed 11¼ min., with a maximum of 74 m.p.h.; Essendine to Werrington Junction, 9.1 miles, 9 min. 5 sec.; and had not the Leeds express in front delayed us into Peterborough, we should have reached there in 97 min. from Doncaster. As it was our time was 99¾ min., schedule being 104 min. Reducing this stop from 9 to 5½ min., we left for London 8 min. late. Holme, 7 miles, was passed in 11¼ min.; Repton, 12.9 miles, in 18 min. 20 sec., at 37½ m.p.h.; Huntingdon, 17.5 miles, in 24 min. 10 sec. at 64½ m.p.h.; and Offord, 20.4 miles, in 27 min.; but at St. Neot's we again ran into the signals of the Leeds train, which thenceforward delayed us all the way to town. Otherwise, I am sure, our 19 min. late start would have shrunk to negligible proportions on arrival at King's Cross. Unfortunately, I omitted to note the numbers of any of the three engines concerned.

The second journey was made with a much heavier load of 64 axles, 437 tons empty and not less than 470 tons full. From York, No. 950, small superheater 4-4-2, could not do better than pass Selby in 21¼ min., and reach Doncaster in 45 min. 5 sec., as booked. There No. 272, large superheater, came on and did some excellent work by passing Bawtry in 14 min. 5 sec.; Retford, in 24 min. 5 sec.; Markham, in 30 min. 40 sec. (at 37½ m.p.h.); Carlton, in 38 min. 10 sec.

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(at 69 m.p.h.); Newark, in 44 min. 20 sec.; Grantham, in 63 min. 25 sec.; and Stoke, in 73 min. 20 sec. Minima were 36 m.p.h. at Peascliffe, and 28 at Stoke. Stoke to Essendine took 111½ min., with a maximum of 74 m.p.h., and Essendine to Werrington, 8 min. 10 sec.; once again delays supervened, but we reached Peterborough in 97 min. 55 sec., or 97 min. net, 7 min. under schedule. From Peterborough the work of No. 1406, superheater, was simply magnificent, especially in its concluding stages. We passed Holme in 11 min. 40 sec.; Ripton in 18 min. 55 sec. (at 40 m.p.h.); Huntingdon in 24 min. 35 sec. (at 66 m.p.h.); St. Neot's, 24.7 miles, in 31 min. 40 sec. (at 53 m.p.h.); signal at Holloway; our net time to London, however, was 91 min., the gain of 7 min. on the fastest present up schedule in force, with a 470-ton load, representing a most commendable piece of work. Between them, the two engines concerned gained 14 min. net from Doncaster to London.

On the North Eastern Railway, out of many runs I have timed very few have been of interest, the bulk of the performance being indifferent in character. There have been one or two exceptions, however. From York, No. 649, V class superheater 4-4-2, on the 6.25 p.m. down, with 425 tons, passed Alne, 11.2 miles, in 16 min., despite slipping at the start;

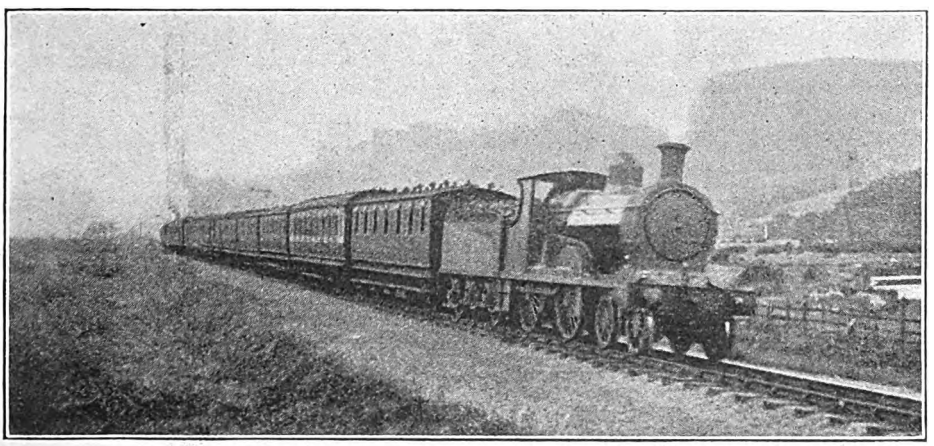

Photo.] CAMBRIAN RAILWAYS. [*K. A. C. R. Nunn.*

Aberystwyth–Whitchurch train ascending Talerddig Bank.
4-4-0 Engine, No. 95 (banked in rear by No. 72).

Sandy, 32.3 miles, in 39 min. 40 sec. (at 60 m.p.h.); Arlesey, 39.4 miles, in 47¾ min.; Hitchin, 44.5 miles, in 54 min. 10 sec.; Stevenage, 47.8 miles, in 59 min. 50 sec. (at 34½ m.p.h.); and Woolmer Green, 52.9 miles, in 66 min. 35 sec. Then followed some hard running, the 5.8 miles on to Hatfield being run in 5½ min., with a maximum of 72½ m.p.h.; the 5 miles thence up to Potter's Bar in the remarkable time of 5 min. 5 sec., with a minimum of 56½; and the 10.2 miles down to Finsbury Park in 9 min. 50 sec., with a top speed of 70½ m.p.h. Most unfortunately, after this sterling effort, which would more than have made good all arrears of time, we were stopped by Thirsk, 22.2 miles, in 27 min. 50 sec.; and reached Northallerton, 30 miles, in 37¼ min., or ¾ min. under schedule. From the latter point, Eryholme, 8.9 miles, was passed in 13 min., and Darlington, 14.1 miles, reached in 19¾ min., or ¾ min. over the time allowed. No. 2196, class Z (3-cylinder 4-4-2), with 455 tons, passed Alne in 15 min. 55 sec, and Thirsk, in 27 min. 30 sec., reaching Northallerton in 35 min. 55 sec. Northallerton to Darlington took 19 min. 55 sec.; or 19 min. net. This was quite a good run with a very substantial train. In the reverse direction, No. 2210, class Z, on the first up night mail, with 275 tons, ran from Darlington to Northallerton in 18 min.

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5 sec.; thence we passed Thirsk, 7.8 miles, in 10 min. 35 sec.; Alne, 18.8 miles, in 21 min. 20 sec. (at 66 m.p.h.); and Poppleton Junction, 28.4 miles, in 30 min. 35 sec.; we reached York after a very severe preliminary slack in 33 min. 50 sec., against 35 min. scheduled. On the 8.48 a.m. *ex*-Darlington, No. 2195, of the same type, with 390 tons, passed Thirsk in 10 min. 40 sec. from Northallerton; Alne in 21 min. 20 sec. (at 66 m.p.h.); and Poppleton Junction in 30¾ min., but was brought to a dead stand by signal at the ¼ mile-post, outside York, having covered 29¾ miles start-to-stop in 33 min. exactly. A really fine effort, quite pre-war in character, was one I timed a few days ago, behind the same engine on the same train, with a 56-axle load weighing in all 400 tons. From Darlington to Northallerton we ran in 18 min. 50 sec., start-to-stop. Thence we passed Thirsk in 10¼ min., at 61½ m.p.h.; Pilmoor, 13.9 miles, in 16 min. 10 sec., at 67 m.p.h.; Alne, in 20½ min., at 71½ m.p.h., sustained on a level track; Beningbrough, 24.5 miles, in 25 min. 35 sec.; and Poppleton Junction, 28.4 miles, in 29½ min. Once again we were badly delayed by signal outside York, but our net time for the 30 miles from Northallerton was not over 32 min. This was quite a refreshing experience.

Finally, there remains to be described that promised run on the North Staffordshire Railway, behind one of Mr. Hookham's large 5 ft. 6 in. 0-6-4 superheater tank engines, on the 12.5 noon express from Manchester to London. On this occasion the 52-axle load scaled 352 tons empty and 375 tons full, and the engine was No. 116. The necessary mileages were all given in the last issue, and I will not trouble to repeat them. First of all, we ran from London Road to Stockport in 11 min. 40 sec., stopping very slowly. Thence we passed Cheadle Hulme in 5¼ min., at 30 m.p.h.; Poynton, in 10¼ min., and, attaining 46½ m.p.h. at Prestbury, reached Macclesfield in 19 min. 50 sec. From Hibel Road Station, banked as usual in the rear, we climbed to the Moss Box in 5¾ min., and ran from there to Congleton in 7 min. 40 sec., with a maximum of only 55 m.p.h. From Congleton, we passed Harecastle in 8 min. 55 sec., and Longport in 13 min., reaching Stoke in 17¾ min. Although I have done better with the 4-4-2 tanks in pre-war days, no discredit attaches to No. 116, whose running aggregated 4¼ min. inside the current times, and gave evidence of very easy work throughout. The Congleton stop, by the way, has been eliminated from the schedule of this train since March 1 last.

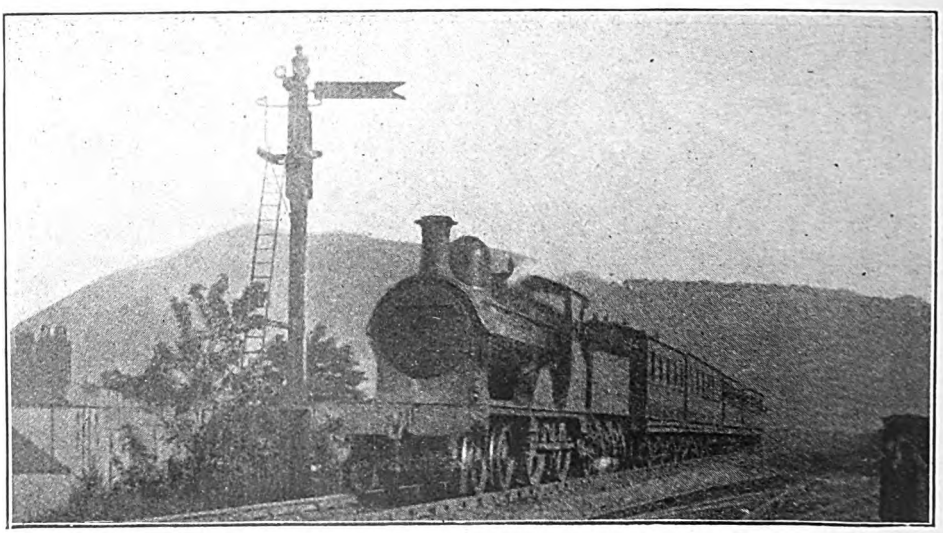

Photo.] DUBLIN & SOUTH EASTERN RAILWAY. [*K. A. C. R. Nunn.*

Shillelagh–Dublin train near Bray. 4-4-0 Engine, No. 57, "Rathmines."

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Electrification of Main Lines in the United Kingdom.

A DISCUSSION OF PROBABILITIES AND POSSIBILITIES.

By J. F. GAIRNS.

FOR many years this subject has figured prominently in technical, traffic and economic discussions; but despite the putting forward of many ambitious projects, and widespread advocacy, largely in interested circles, main line electrification schemes have not yet been realised to any appreciable extent in the United Kingdom, and work done in this direction, beyond the limits of suburban areas, is very small. Establishment of a Ministry of Ways and Communications, especially in view of Sir Eric Geddes' speech, recently, when introducing the Transport Bill in the House of Commons, in conjunction with proposals already current for the erection of super-power generating stations in many parts of the country, opens out a prospect that electrification of main line railways will shortly become a live issue; and that in the hands of the Government, and more particularly under the new Ministry, many developments which were tentatively suggested before the war, but rendered virtually impracticable of realisation by the railway situation created as a result of the war, have become both possible and probable.

It is thought, therefore, that a brief discussion of possibilities and probabilities in the light of Sir Eric Geddes' remarks will be in order. But on the principle that development of so radical a character as this will be can only proceed by stages, and earlier progress must necessarily arise out of existing conditions, it will be interesting to review first those electrification works which are already operating and their positions as starting points for greater undertakings contemplated.

London tube railways are manifestly outside our present purview; but both the Metropolitan and Metropolitan District Railways include features which lead towards main line electrification.

The former operates fast trains between Baker Street and Harrow, and some of these are fast to some extent beyond, while the journeys to Aylesbury and Verney Junction approximate to main line conditions. Consequently electrification north of Harrow towards Aylesbury would entail electrical operation of trains of a main line character. Further, this railway works a portion of its goods traffic—that to Farringdon Street depot in particular—by means of electric locomotives. In the case of the Metropolitan District Railway, fast electric trains are in operation, and in conjunction with the Midland (London, Tilbury and Southend section) actual express trains are worked by electric locomotives as far as Barking. Electrification of the Midland (London, Tilbury and Southend section) to Tilbury and Southend, for which powers have been obtained by the Midland Railway, further widens possibilities in this direction, embracing the whole traffic—express, goods and local—of this busy section of the Midland system.

Similarly, electric working on the London, Brighton and South Coast, London and South Western, London and North Western and North London Railways, including extensions in hand as well as sections already operated electrically, will, in due course, proceed for considerable distances through the London suburban areas, and these form bases for comprehensive electrical systems covering a degree of main line electrification. It is true that, so far, traffic is worked exclusively by trains of a suburban character, and no electric locomotives are in use; but with widening range, operation of other than purely suburban trains will be involved, so that extension to other traffic is both possible and probable.

In the Liverpool area the Lancashire and Yorkshire Railway runs high-speed electric trains to Southport, and is steadily extending its local electric working;

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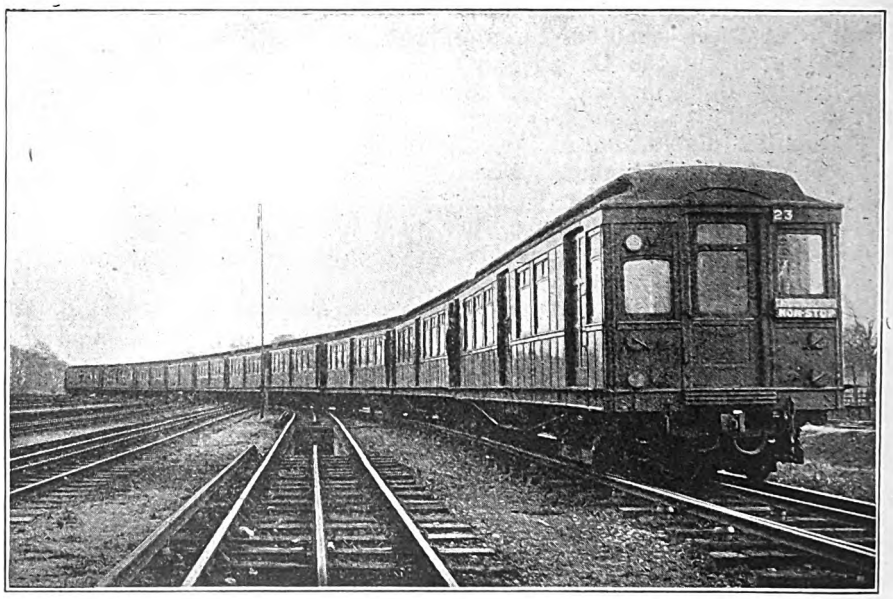
while in Manchester contemplated extensions will gradually entail linking up with the Liverpool lines. It is true that there are important differences in the electrical equipment of the respective areas; but this is fully realised and necessary adaptation is well within the scope of electrical practice.

On the North Eastern the Newcastle area includes express as well as local electric traction, with a degree of goods working by electric locomotives; while the Newport-Shildon line affords the principal example in the United Kingdom of heavy freight and mineral traffic operated electrically.

From these examples of existing electric working it will be seen that there is already an important nucleus for developing local and specific traffic in the direction of main line equipment. The chief difficulty, hitherto, has been that while these sections, by reason of the magnitude of their traffic and its character, justify heavy capital expenditure for equipment, intervening sections between districts so provided, or suitable for similar development, present rather more complex problems.

But whereas it is one thing to advocate equipping main lines for long distances beyond suburban areas purely on the economic basis of whether initial conversion costs will justify themselves by operating results or not, it is quite another matter when it becomes a question of electrifying sections of line which connect up areas equipped for local value, especially when undertaken in view of the installation of super-power stations serving the great industrial areas, and the realisation of a special scheme of developing transit facilities such as that contemplated by Government proposals.

Thus, accepting as a basis the erection of great power plants to serve the Black Country, one can easily conceive that the network of railways in that area will in due course be electrically equipped, for goods and mineral as well as passenger traffic, between Wolverhampton, Walsall, Dudley, Birmingham and Coventry. A natural development is to complete equipment southwards to link up with the London and North Western electric lines at Watford, if they have not extended further from London by that time, so that a London-Birmingham-Wolverhampton express passenger service, and electric goods and mineral working for more than 100 miles continuously, come within the range of practical possibilities. Extending northwards, linking up with the Potteries,



HEAVY ELECTRIC TRACTION OF TO-DAY: TEN-CAR TRAIN METROPOLITAN DISTRICT RAILWAY.

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and eventually, via Crewe, with equipments in the Liverpool, Manchester and Birkenhead areas, further extend possibilities in this direction.

In other districts, via the Midland Railway, electrification in the Birmingham and in the Leeds, Bradford and Sheffield districts opens up corresponding probabilities, while the possibilities offered by the industrial and mineral areas served by the North Eastern Railway, and in South Yorkshire and South Lancashire by all the railways concerned, are far-reaching in the extreme.

Progress of the same character in South Scotland, in Cumberland, in South Wales, and the Bristol area, together with other districts where provision of electrical power on a large scale is contemplated or to be anticipated, open up great possibilities in this connection, while the inevitable corollary is the equipment of intervening country sections to enable through traffic to pass, thus building up a system of main railways, in due course operated electrically for traffic of all kinds.

It is, of course, easy to suggest possible lines of development in this way, and it has to be admitted that, whether company or State provided, cost must in the aggregate be enormous; but as part of a carefully thought out scheme to be undertaken with State aid, associated with the establishment of central power stations on the required scale, it is not only within the bounds of probability, but may be anticipated as the necessary outcome of progress, while cost may not be so difficult a factor when considered on the basis of year by year expenditure spread over an inevitably considerable period. The point to be emphasised is, in fact, not so much the far-reaching and necessarily costly measures involved in the realisation of such proposals, but rather that the present situation includes many factors which already afford ground work upon which to build up the great scheme contemplated, so that the final outcome is by no means so Utopian as it may appear upon first inspection.

Having thus introduced the subject on the ground of general possibilities and probabilities, it will be in order to discuss some of the incidental problems and factors involved.

Operation of suburban traffic electrically is a "proved proposition," and it is clear that in the course of the next few years we shall see the larger proportion of suburban lines so equipped, affecting all the great towns. Moreover, as the tendency is to develop outer suburban areas there will be created complete sections of railway where it will be convenient to operate much other traffic electrically. Possibly this may give rise to exclusively electric sections, electric locomotives being used for traffic proceeding beyond their limits, and changes to and from steam traction being effected at boundary stations 30 or 40 miles out, for express, stopping passenger, and goods and mineral trains. In areas where a number of large towns are within easy distance of one another, as in South Yorkshire, South Lancashire and the Black Country, this will involve all inter-town express and local services and all local freight traffic being so operated, and in due course a condition is to be contemplated that only long distance express passenger and through goods and mineral trains will be run by steam locomotives. Then, as intervening lines are equipped the comprehensive systems anticipated will be gradually built up.

A condition can therefore be looked forward to including: (*a*) long-distance expresses worked by electric locomotives over specific sections and for distances of at least 30 or 40 miles; (*b*) inter-town expresses either hauled by electric locomotives, especially if they have to convey through sections of long-distance trains, but in many cases run with motor coach multiple unit trains suitably designed; (*c*) a limited but extending range of actual long-distance expresses operated electrically from end to end, and possibly made up of multiple unit sections, though more probably drawn by electric locomotives; (*d*) local electric trains, mainly if not entirely multiple unit, for substantially all routes with any considerable volume of traffic, though some of the lighter ones may remain steam-operated, especially on isolated branches; (*e*) through goods and mineral trains worked by electric locomotives as far as journeys include electric sections; (*f*) local electric goods trains; and (*g*) shunting and marshalling mainly performed by electric locomotives.

Hitherto, use of electric locomotives

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has been relatively exceptional in British practice, but it is inevitable that for main line purposes they will be employed extensively, if not exclusively. They must be used for freight traffic, shunting, and working trains which are to be steam-hauled for portions of their journeys. And even where electric traction can be used throughout, trains of special composition, such as those including restaurant and sleeping cars, will almost certainly be worked by locomotives. This practice also follows in view of the attaching and detaching of vehicles *en route*, and the conveyance of horse boxes, carriage trucks, milk and fish vans, &c., in addition to parcels and luggage and mail vans which often constitute no small proportion of the make-up of important trains.

For certain specific services, such as London - Birmingham - Liverpool-Manchester, Edinburgh-Glasgow, Newcastle-Sunderland - Hartlepool - Stockton - Middlesbrough, etc., multiple unit express trains may perhaps be used, even with the inclusion of restaurant cars, &c.; and the policy of operating standard sets strengthened as necessary, already apparent in existing practice, may be incorporated under electrical conditions. There is no reason, indeed, why a standard multiple unit train should not haul several non-motor vehicles provided the motor power available is sufficient. In fact, one can conceive of a composite train between London and Birmingham constituted of several unit sections, and so arranged that after arrival in Birmingham, one portion continues to Wolverhampton, and other sections continue independently with a new motor man, whose control compartment is locked up and out of use during the main journey, to Walsall, Dudley or other towns in that area. There are, indeed, many possibilities attending the constitution of main line trains on a multiple-unit basis, in that through sections for local journeys in areas containing many towns of industrial and trading importance can be operated independently on these sections without requiring special locomotives, while for the main journeys they make up a composite train having the required motive machinery distributed through its sections.

Attractive though this possibility is, however, it is hardly probable that it can apply except on specific and relatively standard routes, and for all the miscellaneous passenger and associated traffic characteristic of main line working it is to be anticipated that separate locomotives will be the rule. In that case all present conditions will remain unaltered and existing rolling stock can be used as freely as with steam locomotive haulage.

That electric locomotives can be used efficiently for heavy goods and mineral traffic and for yard shunting is now beyond question, so that no doubts exist as to practicability on that score. But whereas for widespread electric traction for passenger services the use of conductor rails is conceivable, it can hardly be contemplated that sidings and yards, involving *every* track, shall be so supplied with current. Consequently, it must be accepted as virtually certain that general electrification of main line railways will involve the use of overhead conductors, unless a non-contact system can be devised, so that yards and sidings will be safe for staff working and not rendered complex by the multiplication of conductor rails. Further, general uniformity of electrical equipment will be essential, though whether it shall be d.c. or a.c., low tension or high, single phase or other system, must be left for electrical engineers to work out.

In regard to speed aspects, factors which govern steam operation will still apply. High speed necessitates reserved tracks, and line capacity is controlled by a combination of speed and numbers of trains concerned. Consequently, anticipation is rather in the direction of the speeding up of secondary trains nearer to the level of first-class trains than of exceptional work by the latter. In fact, it may be that non-stops will only be faster than others in that they will gain by the elimination of stops, other trains, by virtue of accelerative capabilities realised by electric traction, being operated at substantially the same speed between stops. The result will be increased line capacity by getting all trains through more quickly on the basis of steady and uniform work, non-stop passenger trains passing others at principal centres, so that they only require headway section by section. There will also be a second

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class of trains, operated as far as possible on relief lines, including stopping passenger trains (except as far as they can be worked in with the expresses) and goods and mineral trains, pick-up services doing their intermediate work in sidings, so that others can pass while they are thus occupied.

On a general basis, then, additional facilities, especially in view of the fact that a plurality of lighter trains can be as economically worked as a lesser number of heavy ones, rather than exceptional speed work, are to be looked for under electrical conditions. This may also apply to goods and mineral traffic; but electrical working is equally efficient with heavy loading, so that this must depend largely upon the traffic conditions which will arise. That these conditions will involve many changes is certain, and drastic alterations in every aspect of traffic working are to be expected. But they will occur stage by stage, and so the "great conversion" will work out its own salvation and solve its own problems largely as they are created.

Finally, the opinion may be expressed that while it is easy to set forth the great possibilities which general electrification of railways offer, it must of necessity be realised by a gradual process of creation, and the magnitude of the issues involved cannot be appreciated until the factors concerned are considered one by one and so building up to the aggregate. Main lines must be dealt with singly and then linked up before full value can be gained, and even then the miscellaneous character and enormous volume of traffic will still require a great deal of steam operation until virtually universal equipment is completed. Moreover, however gigantic may be the conceptions of super-power electric stations, the demands of railway traction in the era foreshadowed will require a tremendous output of electrical energy, and distribution over long and complicated railway mileage will itself entail equipment work on a huge scale.

Advantages contemplated will, however, be very great, seeing that fuel can be utilised on the most economical basis and virtually where it is obtained; water power can be made available; locomotive working can be conserved and hours of duty kept fairly closely to actual periods of useful work; general unification of equipment and traffic methods will be materially assisted; and power demands will be closely associated with actual work performed.

WAR MEMENTOES BY RAIL.

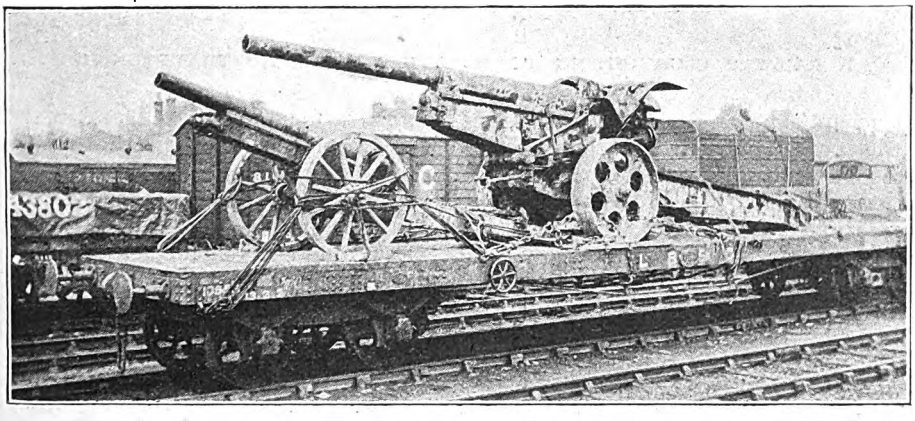

Photo.] [*P. S. A. Berridge.*

GERMAN GUNS CAPTURED BY AUSTRALIAN IMPERIAL FORCES, LOADED AT EAST CROYDON EN ROUTE FOR MELBOURNE.

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The Railway Club: Its History and Progress.

THERE are few things which figure so prominently in daily life as railway travel and traffic, and yet receive so little attention on the part of the general public. This peculiarity is largely traceable to the mental lethargy of the average Englishman, but it is to be feared that the official reticence adopted by so many leading British lines has been instrumental in encouraging this very general ignorance. A casual glance at the press, other than that section devoted to railway matters, reveals the fact that a great deal of misleading information is frequently set forth, while public views of railway operation and its problems are often sadly inaccurate.

Bearing this in mind, it is not surprising that the ordinary citizen knows little or nothing about the practical working of railways. The engineering section of the community is better off: there are many societies which discuss, and many papers which publish from time to time, material of interest to the railway or locomotive engineer. These subjects, however, cover only a part of railway work; of other matters, the all-important goods department is superficially and incorrectly dealt with; while other aspects, such as the conduct of traffic hardly receive attention at all.

At the extreme end of the last century it occurred to a few enthusiasts that something ought to be done to improve public knowledge in regard to railway administration and working, and at the same time bring together all those who were seriously interested in the ways of our railways. Founded in 1899, the Railway Club, a purely unofficial society, comprises among its membership those people to whom, whether from the view point of the staff, the shareholder, or the student, railway matters strongly appeal. There is a club room in London, open throughout the day, centrally situated at 92 Victoria Street, S.W. 1, in the very heart of the engineering and railway quarter; here there is a valuable and extensive library, and the principal railway periodicals, time tables and reference books are

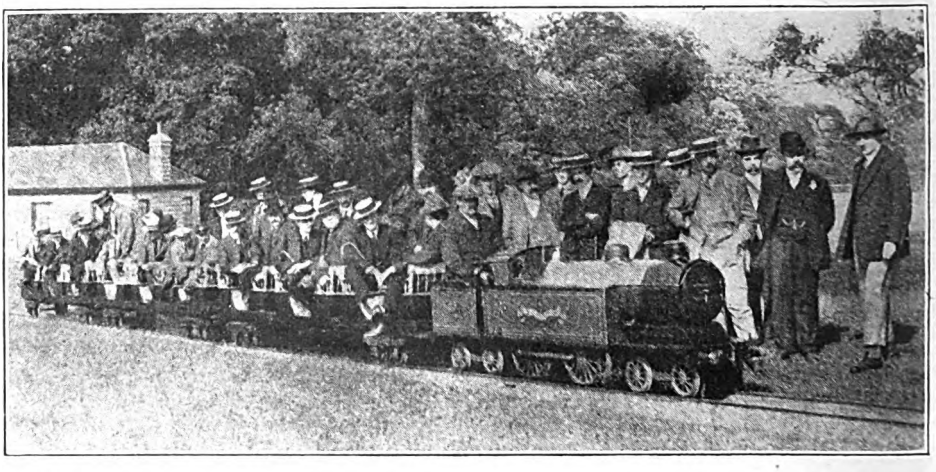

Photo.] [*W. J. Bell.*

A RAILWAY CLUB OUTING TO BLAKESLEY HALL, NORTHAMPTONSHIRE.

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available for the use of members. Meetings are held each month, at which are presented papers, followed by discussion, on a wide range of subjects. Nor do the activities of the Railway Club end here; from time to time, by courtesy of the responsible authorities, visits are arranged to various railway and other works, steam sheds, and lines under construction. Not all the members live in or near the Metropolis, so branches have been established in convenient centres in the provinces to enable the country members to keep in touch with one another and with current events.

The Railway Club owes its origin to a suggestion which appeared in 1899 in a short-lived periodical, *The North-Western Locomotive Journal*, and after a tentative existence of a few months became properly organised on a small scale in London. Difficulties were great, for the members at that time were few and scattered: still, they did not despair, and by their energy and courage triumphed over the most discouraging situations. Meetings were arranged, visits were paid to locomotive sheds and other objects of railway interest, and papers were circulated round the membership, thus providing a link between members at a distance and the main body in London.

Zeal and perseverance carried the Club through its first and most trying year. Circulating Paper No. 1, was sent out on its travels in October, 1899, and in the following November the first visit was made, to Nine Elms locomotive sheds, London and South Western Railway. The next year, 1900, saw meetings held at regular intervals at Tolmer's Square Institute. This resting place was but temporary, a move being made to the Memorial Hall in Farringdon Street during the following year. Here the Club stayed until 1903, when a further move was made, this time to St. Bride's Institute, where two meetings were held monthly. St. Bride's was the home of the Club until December, 1905, after which the last, but not the final, phase was entered upon. Mr. J. F. Gairns thus describes the transition in the columns of the *Railway Club Journal*, a periodical which had a useful career from April, 1901, until shortly before the war:—"At the end of 1904 it was thought that an attempt should be made to acquire permanent headquarters and a regular meeting room, and a sub-committee was appointed informally to consider ways and means.

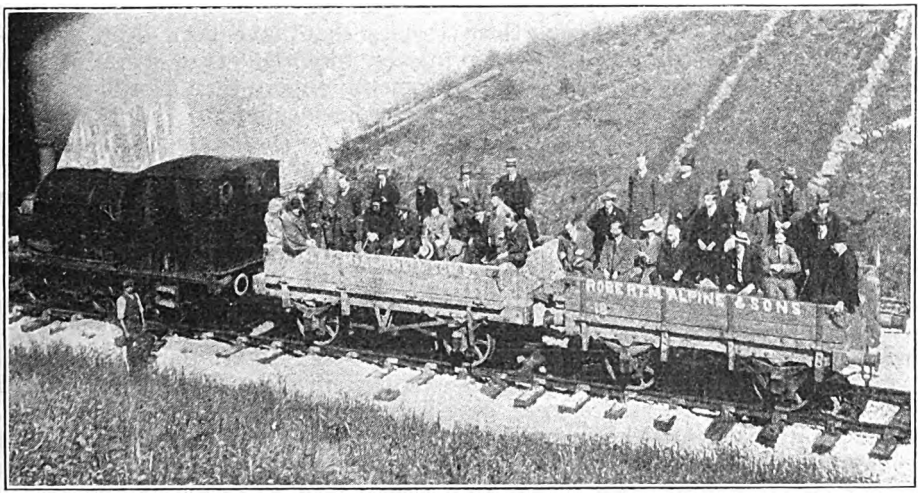

Photo.] [*W. J. Bell.*

A RAILWAY CLUB TRIP ON THE GREAT NORTHERN RAILWAY.

Inspecting the Enfield–Stevenage Line, when in course of construction.

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At the annual meeting in December it was, however, decided that another year must elapse before this could be carried into effect, but the suggested scheme is now (1906) an accomplished fact. The first annual dinner was held in February 1904."

Since those troublous times, the Club has had its abode in Victoria Street: it has held meetings regularly there, and is continuing to do so with unabated energy. The annual dinner and visit had to be discontinued owing to the European conflict, but both these features are reappearing, the Twelfth Annual Dinner being arranged for May 9 next at the Holborn Restaurant with Mr. W. Parker (President) in the chair. This occasion will be a reunion much looked forward to by the members, though their pleasure will be tempered with sorrow for those whom the club has lost in the war. Hostilities and the absence of nearly half the members "on active service" have prevented some schemes and hindered others, but with the dawn of a more peaceful era the Railway Club goes forward with renewed vigour.

During the last few years, the library, already one of the best collections of railroadiana in the country, has been added to, while an excellent programme of visits and railway rambles has been arranged. The list of papers to be read during the immediate future is equally encouraging, those for May and June being respectively by Mr. Cecil J. Allen and Mr. W. J. Scott, two gentlemen very well known to readers of THE RAILWAY MAGAZINE. Many other contributors to this periodical are members of the Railway Club, and the names of J. F. Gairns, E. J. Miller, G. W. J. Potter, H. L. Hopwood, W. E. Edwards, Charles Travis and Basil Mercer are, no doubt, familiar to students of railway subjects. In addition, several distinguished visitors have lectured to the club, including Mr. Thorrowgood of the London and South Western Railway. Mr. W. R. S. Smart of the Model Railway Club, and Mr. W. Chalmers Kearney, whose high-speed railway will, it is claimed, assist to solve the traffic problem in London. A wide range of subjects has been covered during the two decades of Railway Club history, and selection has been interesting and catholic. Railway history, locomotive practice, labour problems, signalling, engineering, models, light railways, goods working, carriages and future developments are some of the topics that have been dealt with—it is never forgotten that a railway means something more than a brilliant run by a handsome engine!

Per aspera ad astra the Railway Club is entering upon a new epoch in its history with the calm confidence born of successful enterprise. The policy that has met with approval in the past will be pursued in the future, and the club as a body will keep itself abreast of all matters that concern railways and railway work. Mr. H. W. Bardsley is the Hon. Librarian; Mr. K. Ffitch, the Hon. Treasurer; and Mr. E. J. Miller, the Hon. Secretary. In the capable hands of these gentlemen, who are aided by a strong and representative committee, it is safe to assume that the purpose of the Railway Club, which is to bring together all who are interested in the ways of our railways and to promote impartial discussion of railway topics, will be faithfully carried out.

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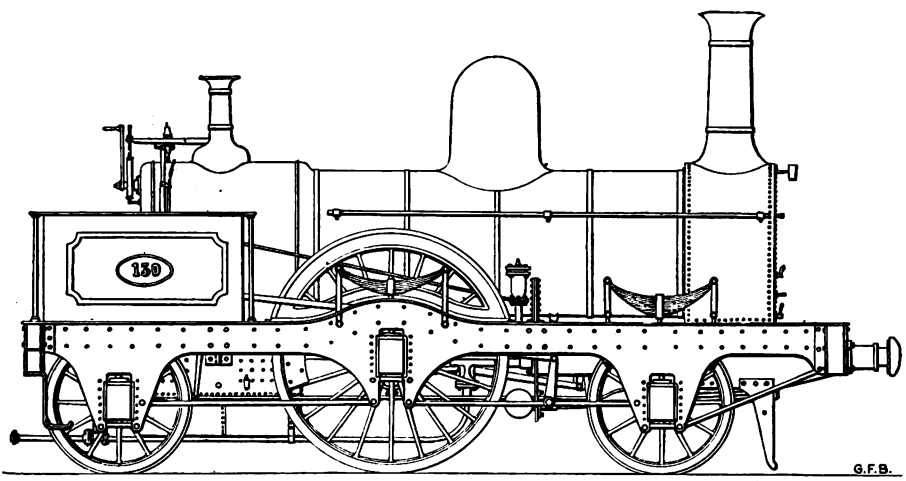
Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. I.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

IN the year 1875 the locomotives of the Midland Railway presented a totally different appearance from that which they now have, and in this respect the alterations have been much more radical than in the case of the London and North Western and Great Northern Railways. On these two lines Matthew Kirtley's chimneys with large open-mouthed bell tops; the domes were tall and rounded, with spring balance safety valves on them, and in place of a safety valve on the firebox there was only a flat topped whistle-mounting, which served also as a manhole cover. Mr. S. W. Johnson had already, towards the



No. 130 (SERIES 130-135) SINGLE-DRIVER EXPRESS LOCOMOTIVE,
Designed by Mr. Kirtley and built by R. Stephenson & Co., 1852. Driving wheels, 6 ft. 8 in. Cylinders, 16 in. by 22 in.

colours of the engines remain the same as they then were, and there are also some similarities in regard to boiler fittings, cabs, &c., more especially in the case of the former railways. Midland engines were, however, then dark green throughout, for the underframes were not painted a different colour as was frequently usual on other railways. In 1876–7, Mr. Johnson altered the colour to a much lighter green, and at the end of 1883 a brick red colour was adopted. The shade of green prior to 1876 was not unlike the present colour of the Glasgow and South Western locomotive stock.

A majority of the engines had Mr. end of 1874, adopted his well-known shape of dome and brass lock-up safety valve cover over the firebox, and there were a few engines at work with these alterations. He also introduced the chimney top so long associated with Midland engines, which, together with the style of the other fittings, he brought with him from the Great Eastern Railway.

The earliest express engines to be described are the old 2-2-2 singles, all of which had 6 ft. 8 in. driving wheels. The first of these had been Nos. 130 to 135 constructed by Messrs. Robert Stephenson & Co. in 1852, with 16 in. by 22 in. cylinders, and four of them were still at work,

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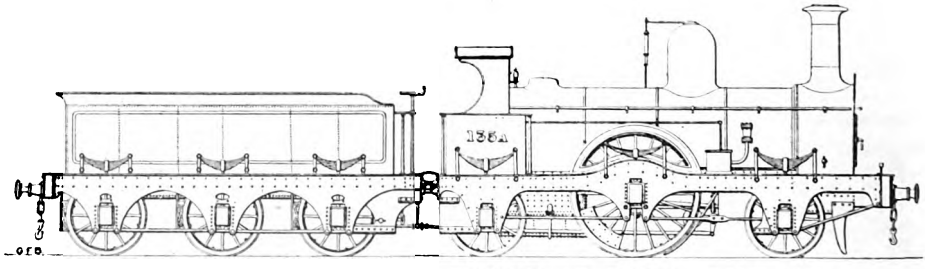
Nos. 130A (afterwards renumbered 4), 133, 134A and 135A. They had been reboilered with flush fireboxes, and Mr. Johnson had added cabs. These engines were usually to be seen on local trains between Derby, Nottingham, Leicester and Rugby, their express days having passed. Nevertheless in 1889 I saw 133 on a fast train from Nottingham to Leicester with a heavy load of 18 six-wheeled coaches, with which it arrived at Leicester to time.

Ten succeeding engines built in 1853 by Messrs. Sharp, Stewart Co., of similar dimensions (Nos. 120 to 129) had, with the exception of Nos. 122 and 129, practically disappeared. Originally they had been favoured with polished brass domes, and in their day, prior to 1870, were almost exclusively employed on express passenger trains between Birmingham and Bristol. No. 122 departed this life about 1879, but



No. 135A (OLD 130 CLASS) AS REBUILT AT DERBY ABOUT 1874.

No. 129, which had been rebuilt, lasted some 10 years longer, and completed a long career in 1889 by putting in a year's service on the Midland trains which were then running between Milford Junction and Hull over the North Eastern line.

The next series were built at Derby and consisted of engines Nos. 136 to 149 (1854–1857) and 1 to 24 (1859–1861), also with 6 ft. 8 in. wheels and 16 in. by 22 in. cylinders. Most of the 140 to 149 series were stationed at Bradford in the early seventies; Nos. 1 to 10 were at Derby and 11 to 20 at Leeds. Only Nos. 8, 11, 16, 17, 145 and 149 were, as far as I remember, reboilered with Kirtley boilers having flush fireboxes, and cabs. The others were broken up with their original boilers shortly after Mr. Johnson took charge of the locomotive department. Nos. 8, 11, 16 and 17 were generally to be seen on the Derby-Nottingham and Lincoln trains and were stationed at Nottingham during the "eighties," until they were scrapped between 1888 and 1891.

The last lot of 20 2-2-2 engines were somewhat similar to but rather larger than the No. 1 class, and the cylinders, were increased to 16½ in. dia. by 22 in. stroke. These came out in 1863 to 1866, the last of them being No. 27 which appeared in February, 1866, from which date until August, 1887, no more single engines were built for the Midland. They were built at Derby and were numbered 25 to 39, 94, and 97 to 100. Nos. 27, 29, 30, 31, 32, 34, 37, 94 and 97 to 100 had solid plate frames slotted out of one piece, and in later years No. 24 of 1861, and No. 33 were supplied with similar frames. In their early days, prior to the opening of the Bedford and St. Pancras line in 1868, they were largely employed on the principal Midland expresses which ran to King's Cross via Hitchin and the Great Northern Railway, but after 1870 they very rarely ran to St. Pancras. In 1875, Nos. 27 to 31 were stationed at Bradford to run the principal London expresses from that town to Trent, but in 1876 they left the north for the Midlands and for a long period Nos. 25 to 29 were stationed at Lincoln working from there to Derby, and as far as Tamworth with the evening mail train. Nos. 30 to 32 and 34 were for many years quartered at Rugby, working to Nottingham and to Derby, and of these No. 31 was in 1890 renumbered 133 to replace the old Stephenson single then broken up. This engine remained at Rugby for more than 25 years and was the only one of the old Midland 2-2-2 singles to have the company's coat of arms on the driving splashers. It was always driven by the same old engineman, of whom it used to be stated that he had never driven a four-coupled engine during his long career,

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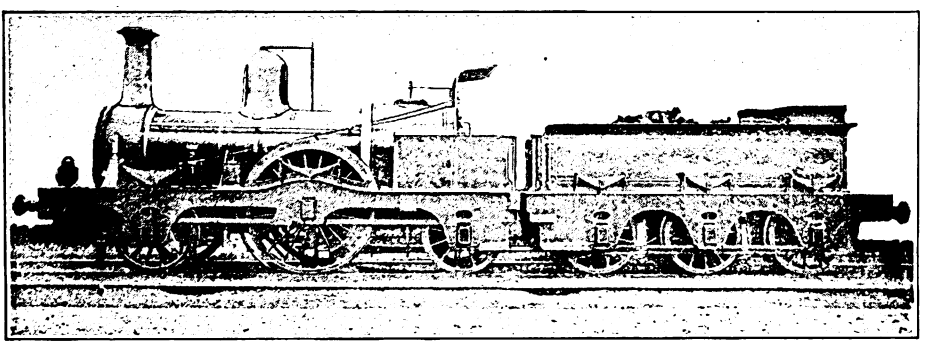
which lasted until the early part of the present century. No. 28, built in 1864, was one of the few Midland engines to have the weather-board carried to the back of the footplate and supported by columns on the side sheets in a somewhat similar manner to the M.S. and L.R. engines. I was told that the origin of these extended weatherboards was due to the mischievousness of some boys who threw a brick from an overbridge at Loughborough, and severely injured an engine driver. Nevertheless the new weatherboards were not popular with the men, as they rattled too much when the engines were running; only some half-a-dozen locomotives were supplied with them, and these disappeared 15 to 20 years afterwards when the engines were rebuilt.

Engine No. 28 (relieved sometimes by No. 26) was for a long time during the "eighties" stationed at Carnforth to run special mail trains to Normanton. These specials were run only when the Furness Railway boat train from Barrow was late and missed the connection with the London and North Western main line mail trains at Carnforth. The Post Office therefore arranged with the Midland to have a special engine always in readiness at Carnforth to take the mails on to Normanton to join the Midland Leeds and London mail. This mail special, which was then run only as required, has since developed into a regular train. Engines Nos. 35 to 39 were usually stationed at Derby to run to Nottingham and Lincoln, but at one period about 1890 No. 35 was quartered at Coalville, and worked local trains to Leicester. The road, however, between Leicester and Coalville is a very heavy one and quite unsuitable for small single engines, so that I do not understand what induced the locomotive running department to station this engine in this district.

In 1889, No. 39 was transferred to Leeds and frequently acted as pilot between Leeds and Hellifield on the 3.12 p.m. Edinburgh Scotch express ex-Leeds, a particularly heavy train. Afterwards, this engine was transferred to Bradford for a few months, and, wonderful to relate, was employed for a time over the hardest road in this district, *viz.*, that between Bradford and Ilkley, which includes several severe banks of 1 in 60, 1 in 88, &c. I believe, however, that 39 acquitted herself over this road better than one would naturally expect.

No. 100 was until 1880 employed at Derby to run the directors' saloon carriage, but when No. 33 took its place in that year, was then transferred to Birmingham, where, together with Nos. 94, 97, 98 and 99, it was stationed for many years. These five engines ran express and other trains to Derby and to Leicester. With the 2.15 p.m. from Birmingham they ran right through to Peterborough. They also worked the West of England Scotch express (the 8.0 p.m. from Bristol) between Birmingham and Derby, and did excellent work with this, a fairly heavy train. On one occasion I timed engine No. 99 from Birmingham to Burton, 31¼ miles (via Whitacre Junction) in just over 33 min. I do not remember this record being beaten within my experience until 1903, when the 4-2-2 Johnson single, No. 180, twice covered the distance in under 33 min.



No. 1A (PREVIOUSLY No. 1) BUILT AT DERBY 1859.
Driving wheels, 6 ft. 8 in. Cylinders, 16 in. by 22 in. Designed by Mr. M. Kirtley.

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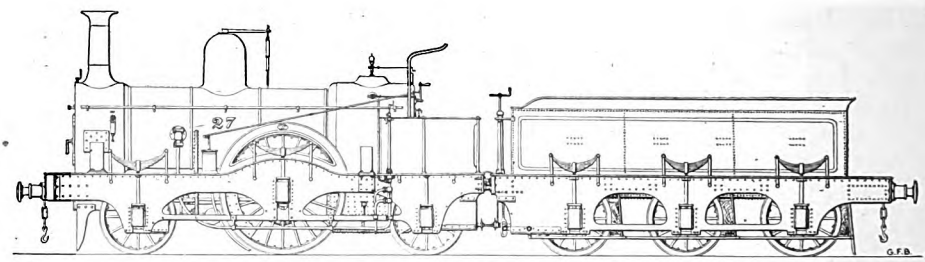

No. 27, THE LAST MIDLAND 2-2-2 ENGINE BUILT AT DERBY, FEBRUARY, 1866 (M. KIRTLEY).

Driving wheels, 6 ft. 8 in. Cylinders, 16½ in. by 22 in.

heavy one for those days (1889) being 14 six-wheeled coaches — about 168 tons.

No. 30 was rebuilt in 1889 at Derby and became No. 16. It was supplied with larger cylinders, 18 in. by 24 in., sand blast, and a large Johnson tender, and was then put to work on the West of England express trains between Derby and Bristol. Although No. 16 did very well over the greater portion of the route, it encountered trouble in starting heavy trains out of No. 6 platform at New Street Station, Birmingham, round the sharp curve and up the 1 in 70 bank, and was taken off this route. It was the only one of the class to be rebuilt with larger cylinders. This engine, together with old No. 29 (which had been re-numbered 4 in 1889), were the last survivors of the 2-2-2 singles, and disappeared in 1904-5. In its last years No. 4—then 4A—ran almost daily from Nottingham to Rugby and back, and did some excellent running.

No. 33 was one of the most famous of the old singles. It was rebuilt at Derby in 1880, beautifully painted, and was retained to run the director's saloon in place of No. 100. No. 33 performed this duty for many years and was almost, if not actually, the last Midland engine to retain the old green colour. During the last two or three years of its existence it was painted red like the other engines and ended an honourable career—greatly regretted—in 1897. I think it was the first engine on the line to be fitted with a train-heating apparatus. This was in 1880 when it was rebuilt, and No. 33 was so favoured to enable the directors to be comfortably warmed up in their saloon. Speaking generally, the old Midland singles of the 25 class were splendid little engines for their size and power, and with moderate

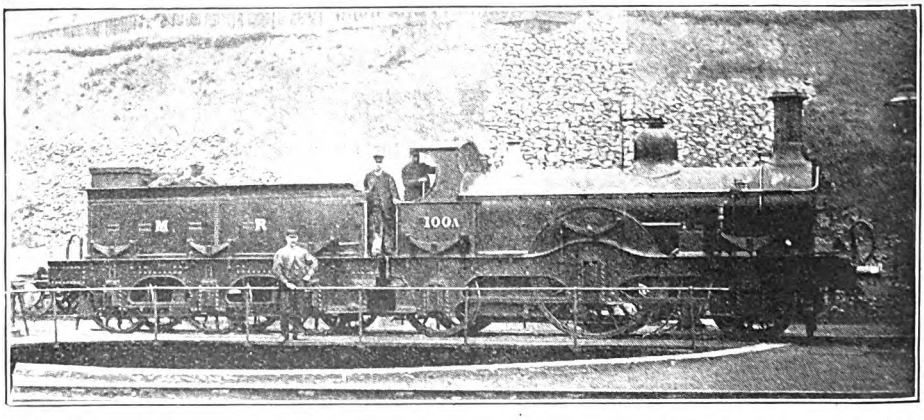

Photo.] [*Loco. Publishing Co., Ltd.*

No. 100A KIRTLEY SINGLE, BUILT 1864 AND REBUILT 1879, BY MR. S. W. JOHNSON.

Driving wheels, 6 ft. 8 in. Cylinders, 16½ in. by 22 in. Steam pressure, 140 lb. per sq. in.

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trains could run like greyhounds. But they became sadly overweighted as the trains increased in length, and eventually suffered the fate of nearly all single engines, for they disappeared one by one between 1890 and 1905.

Amongst their records were the following:—In 1884, No. 4 (old No. 130 built by Stephenson & Co., in 1852) took a heavy train of 15 coaches full of passengers from Derby to Trent (9¼ miles) in 12 min., and attained 60 m.p.h. near Draycott. No. 31, with eight coaches, rebuilt eight of them between 1877 and 1881 as shown in the illustration of No. 86A. They were gradually re-numbered 11, 14, 20, 85, 86, 87, 122 and 145, and were to be found at different periods on various parts of the Midland system, *e.g* Derby and Ashby-de-la-Zouch, and for some years Nos. 14 and 20 were stabled at Colne to work to Skipton, whence with one train they ran through to Otley over the new Skipton and Ilkley line opened in 1889.

The majority, however, of Mr. Kirtley's

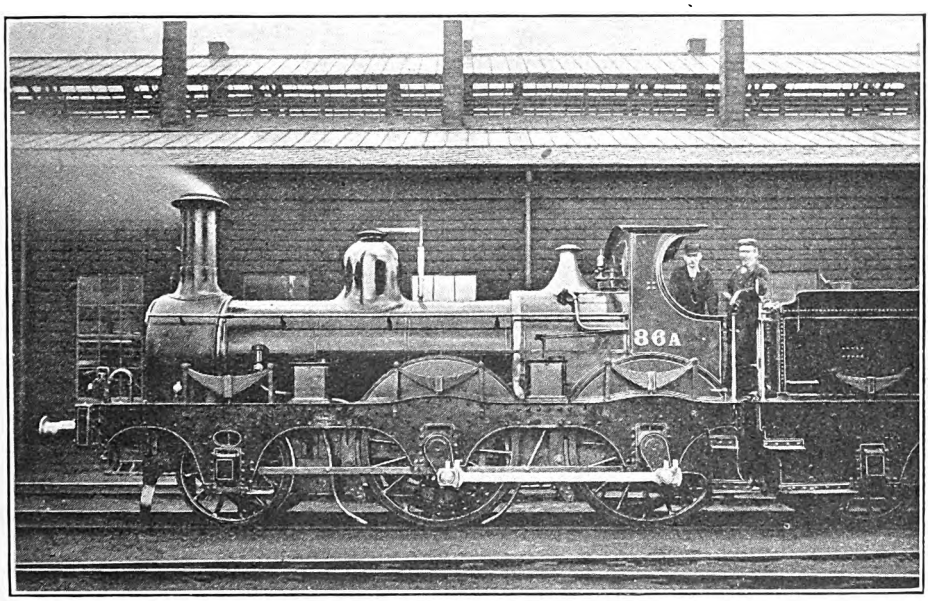

Photo.] [*Loco. Publishing Co., Ltd.*

No. 86A (OLD CLASS, FORMERLY Nos. 50-59). BUILT AT DERBY 1863, AND REBUILT BY MR. S. W. JOHNSON, 1881.

Coupled wheels, 5 ft. 8 in. Cylinders, 15 in. by 22 in.

started from Trent with a Leicester express and covered the first nine miles in 11 min. But my best experience was the one previously recorded with No. 99 on the West of England "Scotchman" between Birmingham and Burton.

The earliest coupled engines which need be mentioned were the old "50" class—Nos. 50 to 59 built 1863. These had 5ft. 8 in. coupled wheels and 15 in. by 22 in. cylinders, and in their early days were generally to be found on the lines west of Birmingham. They must, however, have been very useful little engines for Mr. Johnson four-wheels coupled engines built during the period 1862 to 1868 had 6 ft. 2½ in. coupled wheels. All of them were 2-4-0 engines with double frames and outside cranks, and most of them had raised fireboxes. The earliest of these were Nos. 70 to 79 and 86 to 89 built at Derby in 1862-3 with 16 in. by 22 in. cylinders. With the exception of Nos. 76, 87 and 88, which received newer Kirtley boilers and cabs, none of these were rebuilt, but were broken up during the earlier years of Mr. Johnson's superintendency. They were usually to be found on local passenger

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trains in the Nottingham and Birmingham districts. The boilers of several of them must have been made of good material, for No. 74A was running at Lincoln until 1883 with the old 1862 boiler, and engine No. 86 lasted at Birmingham with the 1863 boiler until 1888.

Engines Nos. 80 to 85 were, however, of a larger pattern, and were built specially to run the 1862 Exhibition specials between Leicester and King's Cross. These had the usual 6 ft. 2½ in. wheels, but the cylinders were 16½ in. by 24 in. and the boilers had flush fireboxes, being of the same design as the standard goods engine

to 159, 115 and 117 built in 1866, Nos. 102 to 113 in 1867, and Nos. 114, 116, 160, 161, 163 and 164 in 1868. The frames of five more of the class were made, but were not erected until Mr. Johnson had succeeded Mr. Kirtley. They were then built in 1873–4 with Kirtley flush boilers, and cabs, and received the Nos. 75, 150, 153, 154 and 155, so that in all there were 29 of the class. They have certainly been amongst the hardest worked engines on the line, for no less than 22 of them are still in service as the present Nos. 1 to 22 (since the 1907 re-numbering). They have been twice rebuilt and now have

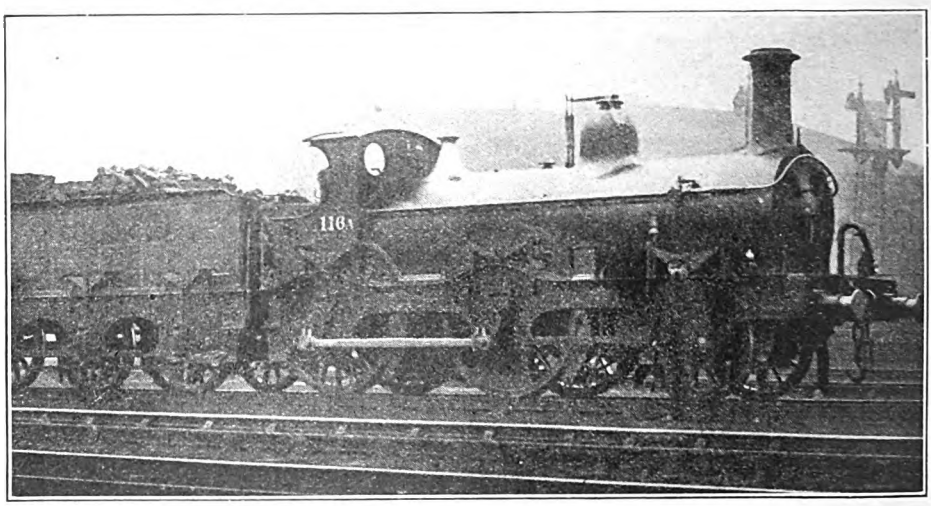

Photo.] [*Loco. Publishing Co., Ltd.*

No. 116A (OLD 116), BUILT AT DERBY, 1868, AND REBUILT 1883 (156 CLASS).

Coupled wheels, 6 ft. 2 in. Cylinders, 16½ in. by 22 in.

boilers. Nos. 80 to 84 were all rebuilt and during many years worked the passenger train service between Birmingham, Redditch and Evesham until they were scrapped during the "nineties."

The next class was an enlargement of the "70" class, and like the latter had the hornplates connected by longitudinal tiebars, but the cylinders were increased to 16½ in. by 22 in. Four of these were built at Derby in 1866, *viz.*, Nos. 101, 118, 119 and 162. They were succeeded by a similar class in 1866 to 1868 of the same general dimensions, but with solid cut out framing of a greatly improved pattern. These may be termed the "156" class and consisted of engines Nos. 156

18 in. by 24 in. cylinders. No. 156, the first of the class, put in an almost unparalleled record of service at one locomotive station—Bradford. It was stationed there early in 1873, and may have been there even before that date. In that year it was fitted with the Westinghouse brake—which was about to be tried on the Midland—and was one of the first engines in this country to be so supplied. For some years it ran a Westinghouse fitted train between Bradford and Leeds. About 1881, No. 156 left Bradford for Mansfield, but after remaining at the latter place for about three years, returned to Bradford in 1884 and was there until two years ago. No. 156 is the oldest

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passenger engine on the Midland, but has changed its original number (in 1907) and is now No. 1. A few years ago it was quartered at the North Eastern shed at Starbeck (Harrogate), under the Bradford district, to run the Midland trains between Harrogate and Leeds.* Bradford has always had a large number of the "156" class, which used to form the "backbone" of the tender passenger engines at this shed. Others in their earlier days were at Nottingham, Birmingham, Buxton and Burton-on-Trent, and the last-named station still has a few of them. They are now scattered up and down the Midland system, though a few remain in the Bradford district. Two of the class, Nos. 3 (old 159) and 20 (old 153), may regularly be seen at St. Pancras where they run local trains from St. Albans.

* I hear that about 2 years ago No. 1 (old 156) left Bradford and was transferred to the Birmingham district.

As a class they have always been very great favourites with the drivers and I can truthfully, say from a long experience and many journeys behind them, that *for their size* there are no better engines in this country to-day. I frequently timed many of the class on the Bradford–Leeds expresses at maximum speeds of 65 m.p.h. through Apperley Bridge. Only about four years ago the present No. 12 was working in turn the fastest Midland express from York to Sheffield with a load of about 150 to 170 tons. This train was timed to pass Swinton Junction, 36 miles, in 45 min., and No. 12 could generally be relied upon to be at least 1 min. to the good at Swinton. The boiler pressure of all these engines has always been 140 lb. per sq. inch. I wish to thank my friend Mr. G. F. Bird for the loan of the drawings from which the illustrations of 130, 135A and 27 have been made.

(*To be continued.*)

Locomotive and Train Working in the Latter Part of the Nineteenth Century.

Railways already dealt with in the "Railway Magazine" by Mr. E. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print.)

GREAT NORTHERN: June, July, 1915. (Both out of print.)

MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. and Oct. out of print.)

GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Dec., Jan., Feb., June, July, and Aug. out of print.)

GLASGOW & S.W.: Sept., Oct., 1916. (Sept. out of print.)

GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)

NORTH EASTERN; Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov., Dec., 1916, Jan. and Feb., 1917, out of print.)

SOUTH EASTERN: June, July, Aug., 1917.

LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.

LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918.

CALEDONIAN: March, April, May, June, 1918.

LONDON BRIGHTON & SOUTH COAST: Jan., Feb., March and April, 1919. (First three out of print.)

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The Unification of National Transport.

By BASIL MERCER.

IN the sense that it has caused us to be able to think "big"—to visualise grand schemes in our imagination—the war may be held to have done good: the number of lives lost, the many maimed men about our streets, the colossal expenditure of money, the scarcity and high prices of food and clothing; all have combined to shake us out of that parochial lethargy which seemed to flourish in English soil. Most people will remember that, before the war, the nationalisation of railways was held to be outside the range of practical politics because of the immensity of its scope; nowadays, the magnitude of the task is one of the last objections that are made when discussing the question; it has, however, staggered some folks to hear that it is proposed, not merely to nationalise, but to bring under one control or direction all modes of transport. The scheme is indeed stupendous, but he would be a bold or hasty man who should doubt its wisdom.

Early Antagonism.

Briefly, the suggestion is to regard the various ways of conducting traffic as branches of the same subject, instead of viewing each one in a water-tight compartment of its own. So many new problems have arisen that there is need of a radical change of method if we are to conduct our business with that combination of efficiency and economy which alone can save us from disaster. Competition between these various modes of carriage has proved a curse rather than a blessing; who does not call to mind the outcry raised against the canals in their early days by the users of the roads? Yet, after a time, the canal took its place in the national life, and the outcry died down, only to rise again with renewed vigour and greater bitterness when railways were first introduced. Many mistakes were made: the canal, instead of being looked upon as an adjunct to the railway, was regarded as an enemy with whom no terms were possible save of extermination. Such an opinion would not be held in these days by enlightened railway officers; in fact, railway and canal development has, to a certain extent, proceeded side by side, many railway companies finding their waterways of great profit and convenience. Unfortunately, the harm done in the now remote past was so great that it would be too huge a task for any one railway to embark on a scheme of canal construction, although it cannot be doubted that some hundreds of miles of new waterways and a standardisation and modernising of many of the old ones is urgently required. The next development of internal transport took the form of a new era of road traffic: the use of the internal combustion engine and the perfecting of the steam road vehicle effected a mild revolution in the business of the carrier. Last, but assuredly not least, it will be necessary to embark upon much new railway construction for the general good of the community, whether it pays or not.

Private Quarrels.

We have witnessed the harm done in the past by competition for traffic in districts that were already well provided; the "railway mania" of 1845 is a thing of the past, but its shadowy influence is not without effect even in these utilitarian days. Let us take a concrete example. The Metropolitan and Great Central Railways work together in perfect harmony, having all "debatable lands" under joint control—a most admirable arrangement when one looks at the geographical situation of the two companies, and both passenger and merchant benefit by the improved working resulting from this partnership. All the same, it must strike the most casual observer that the arrangement at the London end of the two systems is far from being a satisfactory method of dealing with the traffic. Almost within a few yards of one another are two terminal stations, each rigidly reserved for the respective companies. Owing to some disagreement when the new trunk route from the North was first projected, the excellent idea of

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erecting a joint station was abandoned, and we see the daily inconvenience to thousands of people, while the additional cost of maintaining two termini instead of one is no light matter. What an all-round convenience it would have been if both lines could have been housed under one roof! Still, it is no use crying over spilt milk; this is an obvious case of "the evil that men do lives after them"; we must work to prevent such mistakes occurring again.

Electric Power.

Yet another problem faces us in the not far distant future. It is claimed in responsible quarters that electricity can be generated in bulk at a generating station situated close to the supply of fuel for the phenomenally low rate of one farthing (or perhaps less) per unit; even if this estimate errs on the score of cheapness, it is fairly safe to assume that the cost will be extremely low, granted favourable conditions; fuel obtained at the pit's mouth, power to drive the dynamos from enormous and very economical stationary engines having an ample margin of power in reserve, and transmission of current at a much higher voltage than that now used, which current could be used without transformation, thus saving the great expense of innumerable sub-stations. Granted these developments, which are well within the bounds of scientific progress, electricity will be much more prominent in the future as a source of motive power on railways, possibly on canals and roads as well, than it is at present, owing to its high cost. But it would be impossible to conceive such a scheme unless all forms of transport that derive their power from this source are under one control: it would be unworkable if either the State or an independent company undertook the supply of power, while if each section of transport manufactured its own current the great economy of the scheme would be lost. It is easy to see what waste there would be if each of the London Tube Railways undertook the production of its own power!

Marine Control.

The new idea of unified control wisely embraces ports, docks, and (to a certain extent) coastal shipping. This is prudent, for these last are so intimately related to the various forms of transport as to be almost inseparable. It would be a necessary measure, too, if it be desired to eliminate any waste from competitive services. In the past the Highland Railway has suffered severely from traffic being diverted from the land to the sea; if coasting steamers and railways were under one management, such robbery of traffic would not matter, and in time of stress one could afford relief to the other. With land and water traffic under one direction it would be unwise to leave the ports and docks out of the control, these being, as it were, the interchange stations for passengers and goods. Again, relief would be easily obtained when required, should one port, or all the ports in one particular district, become congested with a sudden rush of business: it would make no difference to anybody—the State is impersonal—where the traffic was handled, so long as it was dealt with in the manner most expeditious and convenient for the whole community.

Railway Executive Committee.

It may be suggested that there is no need to create a special board of management or a new government department, seeing that we have the Railway Executive Committee ready to our hands; at first sight it would appear that this is an ideal body to look after the transformation from private to public ownership and to conduct the business afterwards—it would possess both knowledge and experience. On the other hand, the very fact of its being composed exclusively of railway general managers is unfavourable for the purpose of this great change in administration. With a few exceptions, the chief officer of a railway tends to become conservative in thought: his training, his work and his environment all lead him to adopt a cautious and changeless outlook upon affairs; his ideas become static rather than dynamic. Without personal reference to any member of the present committee, I would urge that a railway general manager might be a great success on his own line, with his own staff round him, living in a familiar and friendly atmosphere, and working under known and traditional conditions; with these surroundings re-

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moved the circumstances would be so greatly altered as to make his previous experience, long and thorough though it had been, of little value to him. Railway work is liable to become stereotyped; the professional railwayman is apt to assume the character of a monk, in that he is "in the world, not of the world."

The Trader and the New Proposals.

Transport matters at the present day demand new methods; those responsible for the management of things will need both imagination and judgment, if the scheme is to be a success. For this reason, it cannot be denied that Sir Eric Geddes is a happy choice for the position of Minister of Transport, for he has breadth of view and is not afraid of new things. I do not say that he is indispensable—there would be but little in any scheme which depended solely upon the presence of one man. In a comprehensive speech, the Minister designate of Ways and Communications (to give the Office its full name) expounded the idea of the great transformation that is to be effected. Especially was I glad to see one point mentioned. For years past it has been possible for merchants dealing in non-perishable goods to save warehouse space in the cities by keeping only a small stock of samples: the goods desired were chosen and ordered by the customer; the merchant would say that he had not a sufficient quantity in stock, but that he would obtain it by the next day, or the day after at latest. By the favour of the railways he was enabled to do so: he would telegraph an order to his provincial manufactory; the goods would be handed to the railway about 4 p.m., and delivered, in many cases, on the following morning—a parcel post service. In spite of this quick service, in spite of the saving in warehouse accommodation, and in spite of the fact that the consignment was small and the matter non-perishable; the merchant grumbled at the rate, forgetting all the advantages that he received from this wasteful system. It is to prevent a continuance of this sort of thing, I take it, that Sir Eric Geddes says:—"The private trader had got to learn that storage on wheels was too expensive for this country."

Without discussing the *pros* and *cons* of the Labour question it must be obvious to the meanest intelligence that some change is needed if the necessary reforms are to be carried out without grave injury to the nation in general. The power of the Railway Executive is too limited for drastic and imperative alterations to be effected, while the creation of separate ministries for each section of transport would render the situation more disconnected than it is now. It may not seem easy at once to see the reason for including docks in a transport scheme, but it must be remembered that a dock is a "terminal," a place where goods are loaded and unloaded; on this point the Minister designate says:—"The terminal points of our great import and export trade were in the hands of dock authorities and other terminal owners. It was not to their interest, as they were not very prosperous, to spend money on improving their terminal accommodation when the advantage would go to the conveying companies. The consequence was that measures, such as an increase in the size of trucks, could not be taken very largely on account of the inability of the terminal points to take the traffic." Nearly every school boy (not merely the famous *diseur* of Lord Macaulay) knows that the principal cost in handling goods arises at these terminal points; it would be useless to modernise railway plant for old accommodation, but to ensure its being done in an efficient and economical manner both departments must be under one control. Anyone with any imagination can easily see the necessity for this unification.

Canals and Roads.

Canals and roads will come under the new Ministry of Ways and Communications; the wisdom of including these two forms of transport is to be highly commended, for they are even more closely related to railways than the docks and harbours. Before very long we shall have to consider a vast reorganisation of our system of inland waterways: it will be necessary to modernise these almost forgotten highways of commerce and to standardise their equipment. Properly used, they can relieve some of the more congested lines by carrying such

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merchandise as will not be injured by being a long time on the way. Co-ordination will prevent wasteful expenditure on useless improvements, and a Government Department, with ample funds at its call and no obligation to earn a dividend for shareholders, would be able to undertake new works, if such should be necessary, having in mind the general well-being of the community. For similar reasons, the same co-ordination must be applied to railways and roads: efficient road transport can be of the greatest possible public benefit as a feeder to the great railway systems; but it is an error to regard it as a principal method of carrying passengers and goods over long distances. A properly made road is costly: more costly still is a road that will carry without giving trouble the heavy loads now commonly taken by the enormous motor lorries of the present day. There must be some central and impartial authority which will be able to decide without prejudice between road transport and light railways; vested and other interests must be prevented from inflicting on a particular district a form of transport unsuited to its requirements. English people have a tendency to regard the motor lorry as the only possible means of dealing with traffic in rural areas, forgetting that light railways have been brought to a high pitch of perfection on the Continent and in Ireland; a highway sufficiently strong to carry a continuous heavy traffic such as these folk have in mind would probably cost as much as "the best permanent way in the world" for construction, while the proportionate cost of maintenance would be higher still.

Economies of Standardisation.

Under a unified system, improvements and economies would be easily carried out on the railways. With a central controlling power all traffic could be sent by the best route for the particular purpose. It would thus be possible to relieve, not only congested lines, but places inadequately equipped for dealing with the business in question. New construction could be undertaken without fear of the claims of rival companies; necessary connecting lines (those which would be of general utility, rather than merely of use to one single system) could be laid down without higgling: in some cases it might be advisable to close altogether certain sections of line which at present are regarded as "trunk routes." Duplication without fullest justification is extremely costly, as many shareholders have found to their sorrow.

Without looking for absolute perfection in every detail, I do not think that it is unreasonable to assume that much might be achieved by a committee of experts which would decide on the general policy, and initiate methods of administration which would lead to greater efficiency and economy in working. An enormous saving could be made by reducing the number of locomotive types in use in Britain, from the present grotesque quantity to about eight or nine: in connection with the locomotive, certain scientific data have been ascertained, from which it would be possible to provide adequately for all haulage requirements on our railways. Even if the cost were high in the first instance, it would pay in the long run to standardise the British loading gauge, on main lines and important links, at all events. Here, too, there is room for new ideas: much might be learnt from the best Continental design, both as regards great departures such as compounding and the employment of ball bearings; and minor improvements as, for example, the locating of essential parts of the mechanism in a visible position where they can be easily reached; the adoption of this last practice would save an enormous amount of time and money, when the engine went to the sheds or the repairing shops.

In the same way, passenger vehicles might be of uniform type; apart from the economy which would follow, there would be the advantage that the passenger would know exactly what sort of accommodation would be provided for him: details differ greatly on the various lines. It would also seem desirable if the central authority could decide on a uniform type of brake; signalling appliances, too, might be of similar patterns on all railways. The standardisation of wagon stock is even more necessary than is the case with passenger coaches: to cater for sundry kinds of traffic several varieties of wagon are used on each railway; multiply the number of different types of vehicle on

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any one line by the number of great railways, and a conspicuous source of waste will be disclosed.

The Waste of Speed.

Railways in this country are not allowed to compete with one another by cutting rates like rival drapery establishments: the managements can, however, circumvent this prohibition, by giving better facilities. These may take the form of more expeditious handling of goods and mineral traffic, or (worse still) by generous settlement of claims for damaged or lost consignments. In the passenger department, the road to extravagance is no less plain: the traveller may be offered more comfortable vehicles, or there may be profuse provision of restaurant and sleeping cars; most wasteful of all, he may be tempted to patronise some particular line by reason of the lavish express service on that route. Unnecessarily high speed is by far the most obvious form of waste in railway work: the strengthening of all *materiel* necessitated by the greater strain on rolling stock and road is costly all out of proportion to the benefits derived from the relatively slight shortening of the journey time, while the expense of renewals and repairs of locomotives, carriages and permanent way helps to swell the cost of maintenance; last but not least, the capacity of the line is much reduced by the obligation of allowing large margins in order that the crack expresses may keep time.

Railway Steamers.

A wise provision of the suggested unified control is the inclusion of railway-owned vessels, principally engaged in the various cross-channel services: these are no less intimately connected with railways than motor-bus routes in sparsely-populated rural districts.

The Price of Efficiency.

It is possible that the results of government administration of our transport system may show a deficit at the outset, in spite of the introduction of every method tending to economy and efficiency. Should this be the case, I would maintain that it is better for such loss to fall upon the nation at large than that the community should be hampered by expensive and inadequate means of transport. Taking the optimistic view, let us assume that the Ministry of Ways and Communications will not model its conduct on that of some of the Government Departments during the war: we do not want to change King Log for King Stork. I could wish, too, that everyone could be brought to consider the unification scheme as a whole, instead of in sections. There must be no narrow-minded spirit in the necessary criticism of these essential reforms. I am sorry to notice that many of the motor people seem to regard the transport proposal as if it were the apotheosis of the internal combustion engine, with the result that the press is full of bitter complaints about preferential treatment for the railways: even Mr. Sidney Webb, zealous reformer and sound statistician though he is, dogmatically condemns light railways and pins a blind faith to the motor lorry as the one and only solution of the rural transport difficulty. "In a contemplative fashion and a tranquil frame of mind," as W. S. Gilbert says, we must approach the transport problem of to-day, if we wish to find a satisfactory solution of the difficulties that lie ahead. Clear thinking is always a virtue—it should be practised for its own sake if we desire to avoid the Scylla of waste and the Charybdis of inefficiency.

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The Railway Portrait Gallery.

Elliott] **Mr. I. T. WILLIAMS,** [*& Fry.*
General Manager,
London & North Western Railway.

CONSEQUENT upon the death of Sir Guy Calthrop, the directors of the London and North Western Railway have selected Mr. I. T. Williams for the vacant position of General Manager. The appointment has given unqualified satisfaction, both within the service, and among the trading classes and the travelling public. Mr. Williams has been a North Western man throughout his railway career, which commenced in 1876, and he possesses exceptional knowledge and experience in the working of the enormous goods and mineral traffic which contributes so much to the wealth and prosperity of Britain's premier line.

Mr. Williams became Chief Goods Manager in succession to the late Mr. C. E. Graseman January 1, 1914. During the absence of the late Sir Guy Calthrop as Coal Controller on behalf of the Government, he combined with his duties, until recently, those of Acting General Manager, a position which has now led to his taking the Chief Executive Office.

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Rail Transport Department at the Admiralty.

THE outbreak of the war necessitated the transport of huge masses of stores and materials in addition to exceptionally large numbers of fighting men, and made it imperative for the departments of the State to be in the closest possible touch, practical and otherwise, with the whole of the machinery of railway organisations. Consequently numbers of experienced railway officials found themselves posted in the neighbourhood of Whitehall.

ADMIRALTY RAIL TRANSPORT OFFICERS AND STAFF.

Back Row:—(*Left to right*). Lieut. W. S. Cornish, R.N.V.R., Great Western Railway; Lieut. A. Meddows-Taylor, R.N.V.R., Great Western Railway; Miss S. Mills; Mr. P. A. Jordan, late District Traffic Manager, Indian State Railways; Miss D. Robinson; Lieut. F. Smith, R.N.V.R., Great Western Railway.
Front Row:—(*Left to right*). Lieut. J. D. Prosser, R.N.V.R., Great Western Railway; Miss V. Hooper; Mrs. Briscoe, Secretary to P.R.T.O.); Commander H. F. Whitworth, R.N V.R., Great Northern Railway, Principal Rail Transport Officer; Mrs. Crawford; Miss I. K. Stebbing; Lieut. A. R. Meredith, R.N.V.R., Lancashire & Yorkshire Railway.

So far as the Admiralty is concerned it had many problems of rail transport which were intimately associated with the efficiency of the Fleet and the successful prosecution of the war.

Shortly after the outbreak of war it became necessary for the Admiralty to appoint an officer from the Great Northern Railway to deal with these matters. Not only did this arrangement provide a medium through which railway companies could approach this great department with a certainty that their points of view would be understood in a practical sense, but shipbuilding firms and contractors, who were under obligations to the department to complete ships and deliver stores as rapidly as possible, found in it a medium of appeal which enabled local difficulties to be removed which of necessity arose between firms and railway companies on account of the limited resources of the latter, and the large demands for transport.

As was expected, the duties of this officer grew as they became known, which necessitated the formation of a Rail

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Transport Department at the Admiralty, experienced officers being drawn from the Great Western and Lancashire and Yorkshire Railways. This department has been responsible for the movement by rail of the enormous quantities of coal, oil fuel, materials, stores, etc., required to keep the Fleet and its numerous auxiliaries in their highest efficiency.

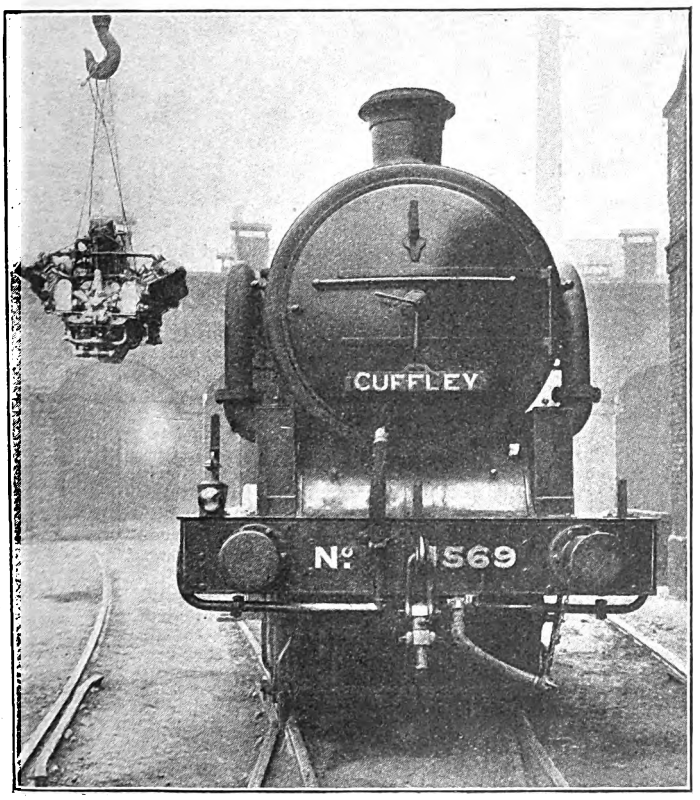
With the inauguration of the Admiralty Controller's Department and the Ministry of Shipping in 1917, and the development of complete local production organisations covering steel and other priority materials for building warships, trawlers, standard ships, etc., increased production of armaments of all descriptions, as well as materials for the repair of ships, it was inevitable that there should be an enormous increase in the duties of the Rail Transport Department, which necessitated further additions to the staff.

The duties of the Rail Transport Officers have been particularly onerous, and involved constant visits to the many Fleet bases, H.M. Dockyards, and other naval establishments, headquarters and district offices of railway companies, steel rolling mills, shipbuilding yards, and Admiralty contractors throughout the country, and also to the Continent.

The photograph re-produced shows the officers and staff of the department, and many of the former will be well known to railwaymen in various parts of the country.

One member of the staff is a retired traffic manager of the Indian State Railways, who, although long since retired, is still very active, and has done excellent work in the department.

AERIAL AND RAIL MOTIVE POWER COMPARED.



The illustration shows a Napier 450 - H. P. "Lion" Aero engine slung by crane for photographing alongside a Great Northern Railway 0-6-2 suburban engine at King's Cross Locomotive Sheds. Comparison is interesting in view of the large power output realised within the small dimensions and restricted weight of the Aero engine. It may be mentioned that the machine entered by Messrs. Boulter & Paul, of Norwich, for the Trans-Atlantic Flight is fitted with two of these engines, while several others which have achieved record performances include Napier "Aero" engines.

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GREAT NORTHERN RAILWAY (IRELAND).

MR. J. B. STEPHENS,

Secretary and Assistant General Manager.

FOLLOWING the retirement of Mr. T. Morrison from the position of Secretary of the Great Northern Railway (Ireland) Company, the directors have appointed Mr. J. B. Stephens to be Secretary and Assistant General Manager as from April 1, 1919. The appointment has been welcomed with keen appreciation in Irish railway circles generally, and on the Great Northern line in particular. Educated at Corrig School, Kingstown, and intending to adopt civil engineering as a profession, Mr. Stephens served an apprenticeship (1885-1890) under Mr. J. C. Bretland, M.Inst.C.E., late City Surveyor to the Corporation of Belfast. In April, 1890, Mr. Stephens was appointed by the late Mr. W. H. Mills, M.Inst.C.E., Engineer-in-Chief, Great Northern Railway (Ireland), a junior assistant in his office at Dublin.

In August, 1900, Mr. Stephens became Assistant to the then General Manager—the late Mr. Henry Plews—and he continued from 1911 to occupy the same position under the present General Manager, Mr. John Bagwell. Intimately associated with the development and extension of the railway's system during the past twenty years, including the acquisition—jointly with the Midland Railway—of the Donegal lines, Mr. Stephens' training as an engineer stood both himself and his company in good stead. Again, in the introduction of modern rolling-stock and the improved train services during the same period Mr. Stephens was "the power behind the throne" and to him an infinite amount of credit must be rendered.

Energetic and versatile Mr. Stephens possesses many interests. He is a keen and capable yachtsman. For many years Honorary Secretary of the Royal Alfred, the oldest Corinthian Yacht Club in the world, on more than one occasion he has won the coveted trophy of Helmsman's Prize in the annual cross-Channel races between Kingstown and Holyhead.

Added to Mr. Stephens' business ability and sportsmanship is the possession of that valuable and happy characteristic so essential in a railway officer of high rank—the attribute of unfailing courtesy.

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The Why and the Wherefore.

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which was published in April, 1919, price 5s. net, by post 5s. 6d. Every reader who desires a copy should order at once to make sure of one. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use.*

Head Codes.

Space will not permit of particulars such as you ask for being given. Indeed, to set forth head-codes of the London and South Western and London, Brighton and South Coast Railways would require many pages. The former now use only white discs and white lights, with six positions, the new system being dealt with in the RAILWAY MAGAZINE, March, 1918. The latter employs white and black cross (green light) discs, with a large variety of route and destination indications. On the London and North Western Railway the revised standard code is in use, see RAILWAY MAGAZINE, September, 1918. District trains have five positions (two over each buffer and one above) and Metropolitan three (one over each buffer and one above), the former all white, while the latter use blue in some combinations. On the North London Railway special discs, &c., are used.

[Reply to E. C. B. THORNTON.]

Tender First Running.

This would obviously be seriously discountenanced if fast work were attempted, but is permitted under suitable circumstances. It is not usual to run tender engines on regular work with the tender leading, but on miscellaneous and composite duties it necessarily occurs here and there, especially if an engine gets to a local or branch terminus unprovided with a turn-table. Sometimes, for short local journeys, the engine is not turned for convenience. It is certainly not pleasant for the enginemen in inclement weather, but it is well to remember that in early days hardly any protection was given at all to the men on the footplate. Where tender-first running is at all extensive, as on goods and mineral service involving shunting, weather-boards are now being fitted to tenders. This is quite common on the Midland Railway.

[Reply to G. P. HARDING.]

Cheltenham-Gloucester Section, Midland and Great Western Railways.

Cheltenham to Churchdown is Midland, and Churchdown to Gloucester, Great Western, each railway exercising running powers over the other company's portion of the jointly-used section. Permanent way is maintained by the respective owning railways, and an observant passenger can notice the change when passing the divisional point. There are many instances where two railways run side by side for short stretches, but we cannot call to mind another approaching in mileage the Midland and Great Western companionship south of Gloucester. As express trains run on both lines, it follows that more or less exciting "races" occasionally happen, actually or apparently so to passengers.

[Reply to "SEASON TICKET HOLDER."]

1 p.m. Express, Euston to Glasgow.

This is a very heavy express, and has received the comparatively easy schedule to which you refer between Carlisle and Glasgow, in order to ensure punctual running under all conditions. Doubtless the time will be reduced considerably as soon as we return to more normal conditions. In addition to Beattock bank proper, the line rises almost uninterruptedly from the 7th to the 22nd mile-post out of Carlisle, mostly at 1 in 200, and Beattock

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bank begins 4 miles south of that station. The final length from Carstairs must also be run cautiously, on account of colliery subsidences and the numerous junctions.

[Reply to "ENQUIRER."]

Walschaert Valve Gear.

This is almost exclusively employed in Europe, and is becoming standard in America, and widely used there. Its principal value is that all parts are accessible, and eccentrics are avoided; but a main reason is also the increasing power and dimensions of modern engines, which render it advantageous to keep the space between the frames clear of moving gear, thus allowing of strengthening members being applied, while the large and heavy eccentrics entailed by inside gear are not called for. It does not rank as a complicated gear, and a good steam distribution is given.

[Reply to H. RISSIK.]

Railway Signal Spectacles.

Glass used in signal spectacles is mostly obtained from firms which specialise in coloured glass. At least one railway gets its supply from a firm in Birmingham which furnishes the Admiralty with its standard red and green glasses for shipping. It is believed that most of the glass and lenses used on the underground systems are of American origin and design. It is greatly to be regretted that the hues and tints of railway signals are not standardised and tested in a better manner than that which now obtains in this country.

[Reply to J. P. PEARITTIGGONS.]

London and North Western Railway Locomotives at Kettering.

Arising out of war control of railways, it is usual for engines to work considerably beyond the limits of their own systems, particularly if they can thus take a train through to destination, and in view of there being various London and North Western Railway lines in the district it follows that engines of that railway would be seen occasionally, and probably regularly at Kettering. Connection may be *via* Wellingborough or Market Harborough, or possibly *via* more distant connections, according to traffic requirements.

[Reply to "SEASON TICKET HOLDER."]

Light Railways.

In his book, "Tramways and Light Railways," Mr. Seward Price, M.A., points out that there is no definition in the Light Railways Act, 1896, either of the word "light" or of the expression "light railways," and therefore a light railway will be distinguishable from a railway proper primarily by reason of its being constituted by a Board of Trade Order and having the peculiar conditions given to the undertaking by such Order. For further facts please refer to the book mentioned. It is published by Stevens and Haynes, Bell Yard, London.

[Reply to F. E. B.]

Heaviest and Lightest 4-4-2 Engines.

Sir Vincent Raven's three-cylinder superheater "Atlantics" on the North Eastern Railway are the heaviest of this type, engine weight (without tender) being about 78 tons in working order. The lightest are the small 4-4-2 class on the Great Northern Railway (58 tons), nearly approached by Sir J. A. F. Aspinall's engines on the Lancashire and Yorkshire Railway, these two classes being the first of the type in the United Kingdom, and almost contemporaneous.

[Reply to A. A. TORRANCE.]

Weight of Superheater Locomotives.

Fitting a superheater necessarily increases weight somewhat, seeing that the additional parts much more than outweigh reduction in numbers of smaller tubes in the boiler. You do not give your name as required by the rules. Please observe this requirement when submitting further queries. Also, you will note that we do not undertake to supply numbers of locomotives of particular classes. Most of the "Adams" 4-4-2 tank engines on the London and South Western Railway are still at work.

[Reply to "COTTENHAM PARK."]

4-4-2 and 4-6-2 Tank Engines, London and North Western and London, Brighton and South Coast Railways.

These engines are not comparable, as those of the London and North Western have 5 ft. 8 in. coupled wheels and are intended for suburban and like traffic, though they frequently do fast working, while the Brighton engines have 6 ft. 7 in. wheels and are classed as for express

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traffic. Dimensions consequently differ materially, and foregoing remarks apply to both types.

[Reply to "PACIFIC."]

Head Codes on the Midland Railway.

No new system of head codes has been adopted by the Midland Railway, except that the revised form of the standard train classification head lights are used as on other lines. Presumably, you have in mind reference boards borne by engines of special and extra trains on most railways, particularly for war and munition traffic, for identification purposes when not regularly scheduled.

[Reply to F. BRIDGE.]

Trains Worked Regularly by particular Engines.

Single engines of selected types sent to out-stations for the purpose of working certain trains necessarily work the same turns day after day. On the Caledonian Railway it used to be the practice to allot certain engines regularly to particular trains, and instances can be found on most lines. But the general method is for engines to work round in links, taking various duties in turn, with a number which are employed as required.

[Reply to W. L. KENNING.]

Varying Train Routes.

Railways owning alternative routes, particularly if mileage is not seriously different, frequently schedule trains to take one or other according to which is most convenient for fitting in with other trains, although they may not be booked to call at stations requiring selection of route for that reason. In some instances there are traffic reasons, or service stops, which do not appear in public time-tables governing the route taken.

[Reply to "R. T. O."]

"Jacks" on Locomotives.

We believe the engines you mention have two jacks, carried on the front end of the framing for convenience. They are thus always available in the event of derailment of engine or wagons. The photograph reproduced on page 135 of the February RAILWAY MAGAZINE was taken, we understand, in the sidings prior to shipment to France by train ferry.

[Reply to R. C. H.]

0-8-0 Tank Engines, Caledonian Railway.

There are six engines of this type on the Caledonian Railway, and they are the only eight-coupled tank locomotives on Scottish railways. Several recent answers give particulars of total numbers of engines of principal types, according to latest information available, and we must refer you to back issues of the RAILWAY MAGAZINE.

[Reply to R. T. HAWKE-GLEN.]

"Relief Lines."

Four track lines on the Great Western Railway are designated "Main" and "Relief," this being really a more correct distinction than "Fast" and "Slow." Signals you refer to, therefore, apply to the "Relief" lines. You do not give your name, though address is stated. Please note this requirement in submitting future queries.

[Reply to "POLAR STAR."]

Pupils and Apprentices in Locomotive Shops.

You should apply to the Chief Mechanical Engineer of the railway you mention for particulars of pupilage and apprenticeship arrangements. Associated with most of the principal locomotive works are Technical Institutes where classes of a suitable character are held.

[Reply to E. V. ARDRON.]

Engine and Two Tenders.

Presumably this combination is definitely specified in staff publications of the railway you mention because it occasionally occurs, as, for instance, from the location of a tender shop with reference to the main works, or use of old tenders as "tank" wagons for special use.

[Reply to "R. T. O."]

Great Central Railway Tank Engines.

There are ten of the 2-6-4 class and three of the 0-8-4 three-cylinder series. The latter are used exclusively in the Wath "hump" sidings, for which service they were designed; the former operate chiefly in the Sheffield area.

[Reply to G. C. GOLD.]

Waverley Station: North British Railway.

This station was fully described in the RAILWAY MAGAZINE, April, 1912. A plan was not then reproduced, however, but

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was in a previous article, February, 1900. Both these numbers are, unfortunately, out of print. [Reply to M.H.]

Firebox Water tubes: London and South Western Railway.

The rectangular casings on the sides of fireboxes on many London and South-Western Railway locomotives provide for access to firebox water tubes fitted by the late Mr. Dugald Drummond.

[Reply to A. SIMPSON.]

South Eastern and Chatham Railway Locomotives.

No further 2-6-0 or 2-6-4 T engines have yet been placed in service by Mr. Maunsell. A correspondent states that No. 790, 2-6-4 T is now at Bricklayers Arms shed, instead of Ashford.

[Reply to J. S. BARTLETT.]

Indian Railway Service.

Ninety-nine per cent. of the Indian railway clerical staff is native.

[Reply to G. E. R.]

Platform "A" at Paddington.

This was built for accommodating excursion trains, and was so used until such facilities were discontinued for the war period. It has since been employed as convenient—as for ambulance and troop trains. [Reply to D. A. E.]

Painting of Semaphore Arms.

The contrast afforded by the white stripe or disc on the red side, and corresponding black stripe or disc on the white side, assist identification of the position of the arm, especially against dark backgrounds.

[Reply to J. J. C. B. B.]

415 Class, London and South Western Railway.

Nos. 416, 419, 420, 421, 424, and 430 of the late Mr. Drummond's 415 class of 4-4-0 engines have been fitted with the Eastleigh superheater and extended smoke-box by Mr. R. W. Urie.

[Reply to J. H. SUTCLIFF.]

NEW SUPERINTENDENT OF THE LINE, GREAT WESTERN RAILWAY.

Elliott] **Mr. R. H. NICHOLLS,** *[& Fry.*
Superintendent of the Line, Great Western Railway.

MR. RICHARD HOWELL NICHOLLS, appointed Superintendent of the Line, Great Western Railway, following the promotion of Mr. C. J. Aldington to be Assistant General Manager, was born in 1868 and entered the company's service in 1884. He started work in the office of the Superintendent of the Line, under Mr. G. N. Tyrell, and was afterwards transferred to the staff of the London Divisional Superintendent. Whilst there he filled practically every position at stations and in the Divisional Office. In 1904, after 20 years' service, he was appointed Chief Clerk to the London Divisional Superintendent, and in 1907 became Assistant Divisional Superintendent. In 1911 he was appointed Assistant to the Superintendent of the Line, being made Assistant Superintendent of the Line in 1917. He is a member of the Railway Clearing House Rules and Regulations Special Committee.

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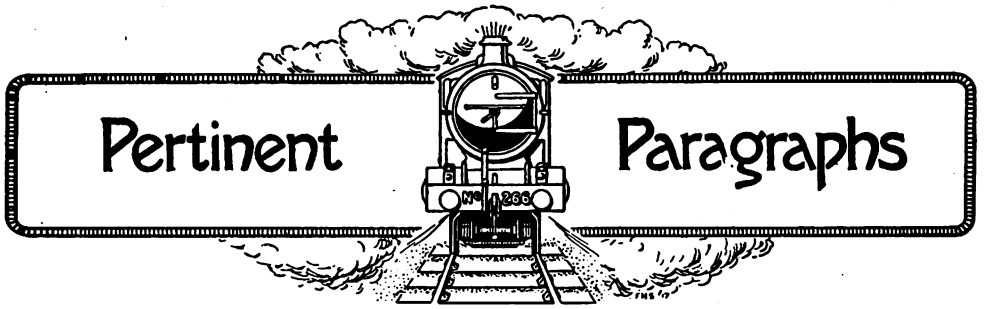

Railway Station Advertising.

OUR frontispiece this month illustrates in colour the new North Eastern Railway scheme for improving the appearance of stations.

In the happy days before the war a special study was made of every station on the line, large and small, and a uniform scheme drawn up for the arrangement of advertisements at stations in accordance with an ingenious plan conceived in the autumn of 1911. The idea of the scheme was to secure a general improvement in the appearance of station premises, and to enhance the value of the advertisements to the advertisers (railway or otherwise), and to secure a greater revenue therefrom.

In this connection the North Eastern Railway has issued a booklet on "Railway Station Advertising," which explains the new methods which are in use on its system, and points out the opportunities which present themselves to would-be advertisers in a flourishing district, such as that covered by the railway in question. The booklet is an extremely clever production, because it shows at a glance the value of the station advertising system inaugurated by the company. This is contrived by means of many tastefully coloured illustrations—the coloured portion being reserved for the particular advertisement which it is designed to throw up, the rest of the picture being tinted in soft grey. The result is at once pleasing and striking, for the eye instinctively catches the coloured portion of the picture, and the attention is thereby immediately arrested. Treated in this way are many advertisements which one sees every day at railway stations and elsewhere, but which are herein classified and grouped with a dignity and purpose never before attempted on so comprehensive a scale.

The old indiscriminate method of exhibiting advertisements has no place in the system devised by the North Eastern Railway, which aims at presenting a distinctive and well-ordered and attractive appearance calculated not only to catch the eye of the business man, but also that of the casua passenger, who, as the booklet veraciously asserts, is thereby "unconsciously induced to study the showcases, posters, plates, etc., to his own and the advertisers' advantage."

Full information respecting the system, the charges for advertising, etc., are given in the letterpress pages, and there is an excellent coloured map at the end showing the North Eastern Railway system. Further particulars may also be obtained from Mr. E. M. Horsley, Trade Advertising Agent, North Eastern Railway, York, to whom, we believe, requests for copies of the booklet should also be addressed.

War Traffic on the North Eastern Railway.

During 1918 74,774,394 passengers were conveyed and 305,761,983 freight wagon miles were run, as compared with 58,777,928 and 254,536,213 respectively in 1913. New works within the area served established during the war include three quarries, seven shipbuilding yards and thirteen factories, besides considerable extensions to many others. Diversion of traffic, especially water borne to rail, entailed increased haulage and longer hauls. To meet traffic demands additional running facilities had to be provided between Newcastle and Berwick and Newcastle and Carlisle, and new sidings, &c., installed at Tweedmouth, Heaton, Carlisle, Low Fell, Blaydon, West Dunston, Darlington and York. Workmen's halts, sidings, &c., had to be provided to serve factories, aerodromes, Government stores, quarries and batteries, and for dealing with timber, gun trains and imported iron ore. Military camps entailed special provision. The camp at Catterick covers an area of about 25 square miles. It is the largest camp in the Northern Command, having had as many as 45,000 men in it at one time. About 750,000 troops were dealt with during each year of the war, and as many as 10,000 men passed through in the course of one day. Goods traffic has also been very heavy, and whilst in 1913 the North Eastern Railway dealt at Catterick Bridge with about

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5,720 tons or 110 wagons, during the war the yearly average has risen to 160,000 tons or 25,000 wagons. For the last year or two a special goods train has run every day, conveying 60 to 70 wagons for the camp. In addition to the camp proper an aerodrome was built near Catterick Village, and the railway company have dealt with about 350 aeroplanes and about 3,000 tons of goods traffic annually in connection with it. A large military camp was established at Ripon towards the end of 1914, as a training centre for 40,000 men. A camp railway about 4 miles in length was constructed to Littlethorpe, a short distance south of Ripon. From the date of the opening of the camp railway to the end of 1918 about 250,000 tons of traffic were delivered to the military authorities or their contractors, and the outward traffic amounted to something like 35,000 tons. Since the signing of the armistice the camp has been used principally as a demobilisation centre and a depot for repatriated prisoners of war.

War Traffic Statistics.

TOTAL number of special military trains run, men conveyed, &c., together with the tonnage carried on behalf of the Government from the commencement of hostilities to December 31, 1918, is given below :—

Number of special trains run.. ..	24,172
Number of Naval and Military passengers conveyed (originating on N.E. only)	11,810,290
Number of workpeople conveyed ..	83,579,480
Number of horses conveyed	134,208
Number of vehicles, motors, &c., conveyed..	9,480
Number of vans of stores conveyed ..	43,204
Tonnage of goods traffic carried on behalf of the Government exclusive of "through" traffic	5,524,989
Tonnage of coal carried on behalf of the Admiralty	1,975,693
Tonnage of coal from Durham and Northumberland collieries to London and the south, nine months ending December, 1918	737,438
Tonnage of coal and coke carried to Cumberland (Coal Controller's reorganisation scheme, &c.). Increase 1918 compared with 1913	1,360,928

Equipment loaned to the Government for use overseas, included 50 locomotives, 4,547 wagons, 2 steam cranes, 27 miles of rails taken up and sent overseas, and 6 tug boats loaned to the Admiralty. One of the tugs, named *Stranton* (re-named *Char* by the Admiralty) was sunk in a collision off Deal on January 16, 1915, and lost with all hands, eight of whom were the company's employees.

Whilst it is impossible to give detailed particulars of the multifarious work carried out in the North Eastern Railway shops on behalf of the Government, the information available shows that a considerable amount of munitions work has been executed, and in addition a large number of covered wagons, general service wagons and ambulance stretchers were specially built for overseas.

The Transport Bill and Sir Eric Geddes.

PROCEEDINGS in Committee of the House of Commons in regard to the Transport Bill have included several features of interest, notably the exclusion for the time being or postponement of municipal tramways and of electricity; but apart from points at issue as between representatives of chief sections of transport, some of whose desires will no doubt be met on the basis of compromise, while other aspects will require to be threshed out in due course, the only essential change made is in regard to financial provisions, section 4, relating to action by Order in Council, having been withdrawn at an early stage.

A great deal of misunderstanding seems to exist as to the compensation paid to Sir Eric Geddes by the North Eastern Railway, and the real situation is well set forth by the *Evening Standard*, whose main points may be quoted :

"The truth is that about 1912 Sir Eric Geddes had certain offers, one of which was from a foreign country, and was of a specially attractive character. Not the least of its recommendations was that, while there was much talk at the time of the nationalisation of British railways, there was no possibility of any change in the status of this foreign undertaking. Sir Eric Geddes laid the position before the directors of the North Eastern Railway, who wished to retain his services. He pointed out the possibility of nationalisation, and in the agreement come to required a clause providing for compensation if the railways should come under State control."

"It must be remembered that during the war Sir Eric Geddes' services were only lent by the North Eastern Railway, and he remained technically one of their servants. When the Prime Minister invited his acceptance of the post of Minister of Ways and Communications, when created, Sir Eric Geddes pointed out the difficulty of his position under the agreement above referred to Since he had a large sum to be paid him in the event of the railways being nationalised, how could he become an agent in their nationalisation ? In order to regularise the position he agreed to cancel his agreement and sever definitely his connection with the North Eastern Railway, accepting compensation on an agreed basis in return for the

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rights he possessed under the agreement. As a fact I understand he has received no lump sum; the settlement reached takes the form of an annuity which was purchased in his favour."

"But in any case the bargain was a perfectly businesslike one, honourable to all parties, and there is no excuse for presenting it in a way to excite prejudice. The incident, however, does bring into prominence the question of the salaries and conditions of political posts. Clearly it will not be easy to get expert Ministers on a reasonable scale of remuneration unless they have some assurance of fixity of tenure and independence of electoral vicissitudes."

Sir Herbert Walker on a Unified System of Railways.

THE Eccentric Club recently entertained the members of the Railway Executive Committee. Sir Herbert Walker, in responding to the toast of the Railway Executive Committee, said he thought they had to take the word "nationalisation" in a very broad sense. Two interpretations could be put upon the word. One was that the Government were going to buy up the railways, and run them in the same way as they did the Post Office. Personally, he did not think that was going to come. The other method of nationalisation was some method of co-ordination between the railways under some guarantee under which the railways would be run by commercial men on commercial lines for the benefit of the State and of the country. He believed that could be achieved very much better than the first proposal. At any rate, the future of the railways was in the hands of Sir Eric Geddes, and he (Sir Herbert Walker) hoped that in the interests of the country he would adopt the second proposal. Some form of unification was essential, and in the interest of the country the railway had to be made self-supporting. Traders could certainly pay increased rates. Traders, as a matter of fact, had had a very unfair advantage, in that while they were selling goods at a very much enhanced rate, they were paying the same rates for railway carriage as they did before the war. With a system of unification and proper control, he was sure they could give the public a much better service than they had ever had before.

Inter-Allied Trans-European Railway Routes.

PRIOR to the war railway communications between the east and the west of Europe were so organised as inevitably to utilise a greater or smaller portion of the territory of the Central Empires. Whether one travelled from Paris to Constantinople or from Lisbon to Odessa, the only practical route was via Germany and Austria. There were also many incidental factors which tended to give the Germanic Powers undue influence and control. For example, Switzerland's foreign trade was solicited, almost compelled, to utilise the railways and navigable waterways leading to Hamburg, Rotterdam and Antwerp, via German territory. Thus in 1913, out of 694,000 tons of merchandise imported by Switzerland from America and other overseas countries, only 244,000 tons passed through the French ports, while the export traffic via France accounted for only 62,000 out of 151,000 tons. That is to say, the French share of the total traffic amounted to less than a third, and was practically confined to the port of Marseilles.

In the course of an address to the Parliamentary Group of the "Cercle Republicain du Commerce et de l'Industrie," M. Mange, manager, Paris-Orleans Railway, recently set forth these and other aspects, and pointed out that in regard to the traffic mentioned the French ocean ports are much better situated than those of Germany or Holland; from Bordeaux, for instance, the distance by sea from New York is less by about 300 nautical miles, by 500 miles to Central America and 600 miles to South America, as compared with the journey via Hamburg. The railway journey is equally to the advantage of France. For instance, taking Berne as the central point of Switzerland, the distance to Hamburg is 1,000 km., while it is only 950 km. to Bordeaux. He therefore proposed that within the territories of the Allied nations a chain of communications should be organised, linking them together without recourse to Germanic intervention, and forming a means of intercourse between France, Italy, the Jugo-Slav and Tcheco-Slav nations, Serbia, Roumania, and Southern Russia. Thus one and the same railway system would unite Odessa Bucharest, Belgrade, Agram, Trieste, Venice, and Milan, whence, via Switzerland, one would reach Paris, England and Belgium, as well as Lyons and the French ports on the Mediterranean, Spain, North and South America, and Western Africa. At Lyons there would also branch off from this great artery the existing lines to Geneva, Bâle and Alsace.

With such a scheme in existence, traffic between London, Paris and Brussels on the one hand, and Serbia, Roumania, Southern Russia, even Turkey, on the other, would not pass through Bavarian or Austrian territory, but over the new inter-Allied system. This system would also handle the Italian and Slav emigrant traffic which formerly embarked at Hamburg or Bremen *en route* for America, as well as the traffic

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between Switzerland and the Atlantic Ocean. New works necessary for the materialisation of this project are numerous and costly, but a considerable amount has already been carried out during the war in regard to the improvement of the French ocean ports as the result of works undertaken by the British and American military authorities. Railway works, including the construction of new lines and improvement and widening of existing lines, represent a greater problem, but the cost of all these schemes is small in comparison with the national and international benefits which would accrue therefrom.

Overhead Travelling Cranes for Army Workshops in France built at Crewe Works, London and North-Western Railway.

THE important part played by the railway locomotive works in this country during the war, in the production of war material and appliances needed for the equipment of armies, military railways, &c., is one to which the RAILWAY MAGAZINE has devoted considerable attention.

Dealing with an aspect which has not figured so prominently as does direct war material, an illustration is reproduced, by courtesy of Mr. C. J. Bowen Cooke, C.B.E., Chief Mechanical Engineer, London & North Western Railway, showing two 45-ton electric overhead travelling cranes made at the Crewe Works for the locomotive repairing shops in France. Each crane has two barrels—one for heavy lifting and the other for light lifts. Maximum heavy lift is 45 tons, and maximum light lift 6 tons. Span is 58 ft.; and speeds are for heavy lift, 3·4 ft. per min; light lift, 12·6 ft. per min.; longitudinal travel, 111 ft. per min., and cross traversing, 36 ft. per min. Voltage is 222 D.C. A 13-in. motor is used for longitudinal travel, and a similar size for the heavy lift. For light lift and cross traversing a 8-in. motor is used in each case. Speed of all motors is 1,500 r.p.m. Steel ropes are used for the lifting. Total weight of each crane complete is 38 tons 16 cwt.

Some more "Bradshawisms."

IN a recent issue, attention was directed to certain eccentric features in "Bradshaw's Guide." These we are pleased to note, have since been rectified. A RAILWAY MAGAZINE reader now points out a source of difficulty to intending travellers, is the way in which the various stations at St. Leonards are named by "Bradshaw" in the South Eastern and Chatham and London, Brighton and South Coast tables respectively. In the former case, on the down journey, "West St. Leonards" (p. 203) is succeeded by "St. Leonards" and "Hastings." In the London, Brighton and South Coast tables (p. 150, *et seq.*), the sequence is "St. Leonards (West Marina)," "St. Leonards (Warrior Square)," and "Hastings." Now, whereas the two stations at West St. Leonards are distinct, the two companies, whose lines unite at Bo-peep Junction, use the same stations at Warrior Square and at Hastings. The chances are that anyone in St. Leonards giving direction to a cabman to drive to "St. Leonards Station" would get taken to one of the stations at West St. Leonards, which are nearer the centre of St. Leonards proper, and might thereby lose his train, as the principal trains stop only at Warrior Square and Hastings. What is needful, therefore, is the insertion of "Warrior Square"—the name by which the station is always known locally—in the South Eastern and Chatham tables.

Another matter which has often occurred to us—relating to a more distant locality—concerns the exceedingly complex Great Central Railway table between Manchester, Sheffield, and Cleethorpes (pp. 510, *et seq.*). Surely, this might be greatly simplified by division into three parts, or separate tables, *i.e.*, Manchester to Sheffield; Sheffield to Retford, Lincoln, and Cleethorpes; and Penistone (*via* Barnsley) and Sheffield to Doncaster, Hull and Barnetby. As at present, it is a matter of some difficulty for even the acknowledged "Bradshaw" expert to find his way about this district. Furthermore, why is it that, although practically all the London—Manchester trains appearing in this table (as between Sheffield and Manchester) carry restaurant cars, only the 3.20 p.m. from Manchester to Sheffield is so designated in "Bradshaw"? "Restaurant Corridor Express, Manchester to Sheffield" should appear against the 8.20 a.m. and 2.15 p.m. from Manchester (London Road), as also against the 12.41, 4.9, and 6.41 p.m. from Sheffield to Manchester.

American Railroad Association.

IN order to provide, during the period of Federal control of United States railways, "a responsible channel through which the Director-General of Railroads may obtain recommendations for the advancement of railroad practice," steps are being taken to amalgamate the major railroad organisations of the United States with the American Railway Association to form the "American Railroad Association." The new organisation will thus combine the former activities of the American Railway Association,

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American Railway Master Mechanics' Association, Association of Railway Telegraph Superintendents, Association of Transportation and Car Accounting Officers, Freight Claims Association, Master Car Builders' Association, Railway Signal Association and Railway Storekeepers' Association. Organisation will consist of five sections :—(I) Operating ; (II) Engineering ; (III) Mechanical ; (IV) Traffic ; and (V) Transportation. Conferences have been held with representatives of the Associations concerned, and the proposed scheme approved by them. A diagram outlining the plan of the new Association is reproduced. The office of the General Secretary is at 75, Church Street, New York City. Leading officers so far appointed are :—W. W. Atterbury, President ; A. W. Thompson, First Vice-President—Acting President ; A. H. Smith, Second Vice-President ; J. E. Fairbanks, General Secretary and Treasurer ; H. J. Forster, Assistant Treasurer.

The Articles of Organisation set forth that the object of the Association is "Discussion and recommendation of methods for the scientific and economical construction, maintenance and operation of American railroads." Action is recommendatory and not binding upon any member. During the period of Federal control recommendations requiring authoritative action shall be submitted to the Director-General, and if approved shall be promulgated to the railroads through the American Railroad Association.

Membership and Constitution.

Membership "consists of carriers which operate American steam railroads, but no carrier operating less than 100 miles of road, including trackage rights, or which operate primarily as a plant facility, shall be eligible for membership." Each 1,000 miles of road or fraction thereof operated by it, including trackage rights, confers the right of one membership. Carriers not eligible for membership may be admitted as Associate Members, without voting power. During the period of Federal control representatives of the United States Railroad Administration will be eligible to serve as officers or members of committees of the Association. Committees provided for consist of an Executive Committee of nine elected members, including the President and Vice-Presidents, and three representatives named by the Director-General, in addition to the Regional Directors ; a Committee on Nomination of five members, and an Advisory Council consisting of the Chairman and Vice-Chairman of each Section. A regular session of the Association will be held on the third Wednesday of November of each year, and special sessions as called. Duties of the five sections mentioned above are specified as follows :—

SECTION I.—Operating, to examine into and report upon questions affecting operating practices, train rules, rules for the operation of interlocking and block signals, rules for de-touring of trains, protection of grade crossings, practices affected by standard time, and details relative to the advancement of the efficiency of the telegraph and telephone departments of the railroad service.

SECTION II.—Engineering, to take action toward the advancement of knowledge pertaining to the scientific and economic location, construction and maintenance of railroads.

SECTION III.—Mechanical, to take action toward the advancement of knowledge concerning the principles of construction, maintenance and service of the rolling-stock of railroads.

SECTION IV.—Traffic, to consider and report upon questions affecting the relations of the operations of railroads and the public.

SECTION V.—Transportation, to consider and report upon questions affecting the efficient utilisation and interchange of equipment, the handling of railroad business, mail and kindred subjects.

Membership of the respective sections is covered by the Articles of Organisation and Bye-laws, modified or amplified with regard to the scope of the section, and in certain instances, especially Section III—Mechanical, to suit special conditions arising out of the working of particular Associations included in the amalgamation.

The Executive Committee has appointed temporary general committees for each of the Sections—consisting of representative officers of various American railways.

Filling Lavatory Cisterns : A Novel Development of "Safety First."

THERE seems to be no limit to the scope of the "Safety First" movement, especially when it is associated with working efficiency and convenience. An interesting development of this class is the arrangement for filling cisterns of lavatory carriages, devised and patented by Mr. F. Hare, of the Publicity Department, London and North Western Railway. According to the method generally adopted not only are two men required, but one of them has to climb on to the roof. One result of the man being there is that he has to be protected by a red flag, and if the locomotive is being changed the fresh engine may not back on to its train until the red flag has been removed. Standing on or walking along the roof from

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appliances can be used, fitted with a short connection and a stop tap, attached to the flexible pipe. The bottom of the fixed pipe has a cap, secured by a chain, to cover the mouth when not in use.

Electrical and Mechanical Equipment: All-Metal Cars, Manchester-Bury Electrical Service, Lancashire and Yorkshire Railway.

Two important papers were recently read before the Institution of Civil Engineers, one by Mr. G. Hughes, Chief Mechanical Engineer, and the other by Mr. F. E. Gobey, O.B.E., Assistant Carriage and Wagon Superintendent, Lancashire and Yorkshire Railway. The former dealt with the subject set forth above; the latter with all-steel vehicles generally, but with special reference to the Manchester-Bury equipment. Mr. Hughes dealt with the Lancashire and Yorkshire equipment in the order of current passage. From the collector shoes, connection is taken to a rotary transformer which supplies low-tension 100-volt current for operating the control equipment. The 1,200-volt portion of the equipment is placed in a high-tension compartment, completely isolated from the remainder of the car, the door of this compartment being interlocked with the main switch, which is of the single-blade type. The rotary transformer is a 10-kilowatt machine. Electrical control equipment is of the shunt multiple-unit type, arranged for automatic or manual operation in the forward position, and manual only in the reverse. Field control is also provided for. Automatic control is operated by means of relays governed by the main motor current. Succeeding contactors cannot operate until the motor current has fallen to a predetermined value, and the sequence of operation is controlled by electrical interlocks. The controller has nine positions of the handle, the last being for supplementary field control, and there are four positions of the reversing handle. The main circuit-breaker is of the magnetic shield type, and can be tripped or re-set from the motorman's compartment. Contactors are made up in two groups, one group at each end of the car, and controlling two motors. Each single contactor is fitted with a magnetic blow-out coil and two arcing horns protected by soapstone shields. The motor cut-out is manually operated, and when in the normal position two motors are in circuit; if moved in either direction one or other of the motors is cut out. Each reverser controls two motors, and is solenoid-operated from the master controller.

Motor Bogies, Brake Gear and Lighting.

In the motor-bogie locomotive practice has been adopted, and the design is the outcome of the development of the built-up frame bogie. A double-brake block arrangement is fitted, and the average life of a brake block is about 5,700 stops, excluding signal checks and coasting on down grades. Each bogie is fitted with two motors geared to the axle through spur gearing, the ratio being 2·36 to 1·00. Nose suspension of the motors is adopted, half the weight being spring-borne, and the other half resting directly on to the axle. Motors are 200-h.p. and have been designed on experience gained on the Liverpool and Southport line. Vacuum-brake equipment includes a pump capable of releasing the brake in 12 secs., and a brake valve which admits air to the train pipe, and also starts and stops the pumps. A separate vacuum reservoir is provided for operating the horn in case the current is cut off for a short time. In the design of the brake-valve the "dead-man's" handle is incorporated, which applies the brakes and cuts off current to the main motors. Motors (5-h.p.) for driving the pumps are series wound, and running at 1,000 r.p.m. on a 100-volt circuit. This pump is operated through a switch in the brake-valve and an automatic regulator.

Below the brake-valve is a tripping-switch, which breaks the master-controller circuit when the "dead-man's handle" comes into operation, or when the motorman uses a special key for converting the brake-valve into an ordinary van valve. Bell code signals between guard and motorman are supplied with current from a small battery of accumulators; the latter are also used for emergency lighting. Lighting of the cars is taken from the 100-volt circuit, and the heating from the 1,200-volt circuit. Equipment receives an examination and attention at the end of periods varying from three days for vital parts to 12 months for general overhaul, and the author considers that this periodical examination has largely contributed to the efficient service of the electrified lines.

All Steel Passenger Cars.

MR. GOBEY pointed out that of 52,250 passenger carriages on British railways nearly all have timber structures, whereas in the United States metal construction is now standard practice, 17,601 steel passenger cars being in use. He discussed reasons for this, and he devoted some attention to designs in use across the Atlantic. The use of metal in existing British cars was briefly described, and an appendix set out the number of passenger-cars with bodies and underframes built of timber and metal; this being followed by statements of the present and anticipated timber shortage and the position of metal supplies. Promi-

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nence given to the subject of telescoping and fire when accidents have occurred to passenger-trains in recent years was dealt with by a citation of some of the recommendations made in Board of Trade reports and by showing that metal construction would more completely protect passenger rolling stock and secure the greatest safety to the travelling public.

The principal feature in the paper was a full description of the all-metal electric cars of the Lancashire and Yorkshire Railway, these being the only railway passenger-cars constructed entirely of metal in Great Britain. Details of design are recorded for the first time, with tables showing the relation of timber and metal constructed cars for weight and cost, and also the maintenance experience during a period of 2½ years. The author drew attention to some special features of metal vehicles after briefly touching on the tendency to uniformity of stock if metal construction is adopted, discussing the general design of cars and efficiency of passenger accommodation for main-line and suburban services in Great Britain. An all-metal open car was advocated of an economic width and length to give the greatest comfort to passengers and the best results in efficiency; comparisons were made of typical designs with the present types of cars operating on British and American railways in tables and diagrams and the paper concluded by referring to some of the features affecting the future of all-metal passenger-cars on the railways of Great Britain.

Railway Lighting and Maintenance.

An interesting paper on this important though little-considered subject was recently read by Mr. A. Cunnington, Lighting Engineer, London and South Western Railway, before the Illuminating Engineering Society. The author pointed out that cost of maintenance before the war was approximately 1 to 4; now it is nearer 1 to 2. He advocated small mantles for incandescent lighting, grouped for higher powers. Electric lighting involves so many different voltages and supply conditions, that standardisation is difficult. He advised dispensing with outer globes for out-door lanterns as far as practicable. In platform illumination, if fairly uniform, a considerably lower maximum and average illumination will suffice. Illumination measurements should be made about 3 ft. above the ground. Special local lighting should be provided for ticket collecting barriers and for time-tables. For the former it is quite usual to find special lamps in use; in fact, were this not so the general standard of illumination would have to be unnecessarily high. In the matter of time-tables, much can be done in the way of local screened lighting when time-tables are grouped in a few convenient places. Name-boards and name-plates should be well lighted. Platform lighting has to be largely moulded according to constructional details, and this is especially so under the typical low roof of the verandah type. For the part of the platforms beyond the roofing "beacon" lighting is quite satisfactory, for the lighting of the train itself supplements platform lighting just when it is required. For oil lighting of stations pilot flame oil lamps were recommended, and where intervals between trains are lengthy it is worth while installing such devices, even although each lamp may require individual manipulation. Acetylene, petrol-air-gas and vaporised oil were also discussed. For control of electric lighting lamps may be in two circuits, alternately arranged, one being switched out between trains. The system of distance control can also be applied to gas lighting. In this case lamps are arranged alternately on separate supplies, one being in continuous use and the other turned out between trains. A special by-pass service is run to the second group of lamps and mercury seals fitted to prevent air getting back into the pipes.

Goods Shed and Yard Illumination.

It is difficult to define any controlling considerations, there being so many factors affecting each situation. It is suggested that vertical illumination, measured in a plane at right angles to the direction of the sidings (and at 3 ft. above the ground, approximately buffer height), should not be less than 0·01 foot-candle. This would apply to any class of yard and any part of the yard where shunting is carried out. It would, of course, be necessary to supplement this by a much higher minimum for working areas, such as the "shunting neck," or series of points leading into sidings in a gravitation yard. Minimum values proposed are:—

(*a*) 0·01 foot-candle—a universal minimum for any part of a yard where shunting is done.

(*b*) 0·05 foot-candle—a minimum for the working area in single engine yards.

(*c*) 0·25 foot-candle—a minimum for the working area in multiple engine yards.

In most goods yards one finds row after row of wagons of high and low types with only a few feet between them, and minimum illumination here would in most cases be below the limit of ordinary photometric measurement. To provide a reasonable minimum requires lamps between every running road, and the necessary clearance

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does not in most cases admit of this apart from the question of cost. As a matter of fact the shunter always relies on his hand lamp even in the best-lighted yards and it would be unreasonable to attempt to provide general illumination such as would obviate the use of hand lamps. The most suitable arrangement of lamps for yard lighting, where gas lighting is in use, is with comparatively low candle-power units not more than about 20 ft. above ground and spaced as frequently as the clearances will permit. The introduction of gas-filled tungsten lamps has resulted in the displacement of arc lamps to a large extent, chiefly on account of reduced maintenance charges, and there is no longer any good ground (unless it be impossible to select sites for extra posts) for erecting lamps on sky-high masts.

Other Branches of Railway Lighting.

ENGINE sheds have distinctive features. First there is the element of danger owing to moving engines and to the inspection or wash-out pits. This makes an adequate minimum illumination imperative, and should not fall below 0·05 foot-candle, at any rate not in the neighbourhood of the pits. Vertical illumination plays an important part, because the sides of engines standing in rows must be properly lighted to enable the cleaners to do their work effectively.

This means that reflectors of an open pattern should be used. A further feature is the accumulation of dirt and the corrosion of metal work due to a more or less permanently smoky atmosphere. This calls for fittings which can be easily cleaned, such as are provided by a good quality of vitreous enamel, and in electrically lighted sheds all-porcelain lamp-holders have been found very satisfactory in withstanding the corrosive effect of sulphurous fumes.

Uniformity is quite as important in subway lighting as it is on platforms, and minimum illumination need not be high so long as a reasonable degree of uniformity is secured and, it should be added, an absence of glare. As it very frequently happens that glazed tiles line the walls, no elaborate reflectors are necessary, the somewhat despised conical opal shade being quite effective so long as it is deep enough to screen the lamps from the eyes.

Intensity of illumination should be above the average for offices, in view of the large amount of checking of ticket numbers that has to be done and the considerable sums of money handled. Fittings should be designed to give good vertical illumination on the ticket cases. This points to the use of angle reflectors where local lighting is in vogue, but in direct and semi-direct lighting in a large booking office have shown very satisfactory results.

Pullman Cars on the Caledonian Railway.

OUR paragraph under this heading last month requires correction in regard to certain details. In addition to cars mentioned, *Mary Hamilton*, dining car, is running between Glasgow (Buchanan Street) and Dundee; and *Mary Beaton*, a parlour buffet car, on the Edinburgh-Glasgow route. *Duchess of Gordon* and *Baroness Nairne* are cars whose completion has been delayed by the war, and are not yet in service. The following trains are now equipped with Pullman car facilities:—*Glasgow to the North:* 7.0 a.m. (breakfast car to Perth); 9.45 a.m. (luncheon car, Perth to Aberdeen); 1.30 p.m. (tea car, Perth to Aberdeen); 5.0 p.m. (tea and dining car to Perth and Dundee); 6.15 p.m. (dining car, Perth to Aberdeen). *From Aberdeen to Glasgow:* 6.10 a.m. (breakfast car to Perth); 9.0 a.m. (luncheon car, Dundee, 10.30 a.m., to Glasgow); 12.0 noon (luncheon car, Aberdeen to Perth); 5.30 p.m. (tea and dining car, Aberdeen to Glasgow). On these services the Pullman cars are available for first and third-class passengers without extra charge. *Glasgow to Edinburgh:* Breakfast, buffet, luncheon, or tea and dining cars, 8.40, 11.0 a.m., 1.30, 4.0, 5.5 (except Saturdays), and 6.45 (Saturdays only) p.m. *Edinburgh to Glasgow:* 8.50, 11.0 a.m., 1.30, 3.45, 5.0 (except Saturdays), and 7.5 (Saturdays only) p.m. These are for first-class passengers only. Supplement, 1s.

Southern Routes: 11.30 p.m., sleeping car express ex Euston has the Pullman car *Fair Maid of Perth* attached between Carlisle and Glasgow daily (including Sundays) for serving breakfasts, and returns as a tea and dining car on the 4.35 p.m. ex Glasgow (Central). The 9.15 a.m. ex Euston has a Pullman dining car attached from Carstairs to Aberdeen, the return service being by the 9.0 a.m. Aberdeen to Carstairs. These facilities are proving very popular, and in due course the full Pullman car accommodation contemplated will be installed.

Travel Booked in Advance.

DESPITE the great success of the Lancashire and Yorkshire Railway scheme of passenger traffic regulation between Manchester and Blackpool last summer the *Railway Gazette and Railway News* states that it appears unlikely that this method of controlling excursion traffic, though an alluring one, will be adopted to any great extent. It is understood that the railway companies have considered the question of extending the

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practice but have decided that there are many difficulties in the way of its general adoption. It will be remembered that under the Lancashire and Yorkshire scheme it was essential for all passengers intending to travel on Saturday to book their tickets in advance. Each ticket was marked for a particular train and "booking" for that train stopped immediately the whole of the accommodation had been allocated. The result was a distinct gain to the public. Under ordinary conditions, the boarding of a Blackpool train at Manchester (Victoria) was a highly problematical accomplishment, owing to the huge crowds wishing to travel; whilst, under the "rationing" scheme, there was an entire absence of congestion, as passengers were not admitted to the platform unless they held tickets for the particular train. Such a scheme of regulation is of two-fold advantage; it allows the railway company to legislate for the comfort of passengers and, by reducing congestion, enables the station duties to be performed more easily. It is obvious, therefore, that there are distinct possibilities for the extension of this method of regulation in connection with short-distance traffic on selected occasions, and it will be interesting to watch developments of this character.

East London Railway History.

FROM the writer of the article which appeared in the April RAILWAY MAGAZINE we have received the following communication:—"A friend has drawn my attention to the fact that the through Liverpool Street —Brighton service commenced, not in 1884, but in 1877. The trains then left Liverpool Street and Brighton at 10.47 and 11.30 a.m. respectively. During 1883 and 1884, through coaches only (instead of through trains) ran at the times mentioned in the article, the carriages being attached to, and detached from, London Bridge trains at New Cross. From 1886, Great Eastern Croydon trains used Croydon *Central* Station until 1890, when it was closed. In the summer of 1898 the South Eastern Railway ran a through train between Shoreditch and other East London stations and Ramsgate and Margate."

A Suggested North Eastern Railway Improvement.

As is well known, there is a useful morning train from Newcastle to King's Cross, which in pre-war days started at 8.0 a.m., but is for the time being put forward to 7.50 a.m. So extensive is the patronage accorded to this express that for some months past a relief train has been run daily at 7.42 a.m. as far as York, where several important connections are made in various directions. Now a large proportion of the passengers joining these two trains do so at Darlington, having come principally from the populous towns of Middlesbrough, Stockton-on-Tees, and Hartlepool, from which early starts are made at 7.24, 7.31, and 6.55 a.m., with a wearisome wait of three-quarters of an hour at Darlington. Why, then, not run the relief train from Newcastle *via* Sunderland and Stockton to Northallerton and York? Here is a suggested time-table:—

Newcastle	dep.	7.17 a.m.
Sunderland	arr.	7.39 ,,
	dep.	7.42 ,,
West Hartlepool	arr.	8.11 ,,
	dep.	8.14 ,,
Stockton	arr.	8.32 ,,
	dep.	8.36 ,,
Northallerton	arr.	9.0 ,,
	dep.	9.4 ,,
York	arr.	9.38 ,,

Sunderland passengers, instead of travelling as at present by special express to Durham, at 7.33 a.m., would gain nine minutes, and the latter train might be cancelled. West Hartlepool passengers to the south would be saved no less than 79 minutes, and Stockton passengers 65 minutes. Passengers from Middlesbrough to the south would take the existing 8.20 a.m. train to Stockton, and join the express there, thus saving 56 minutes. The 7.50 a.m. from Newcastle to London, relieved of a 6-minute stop at Northallerton, and gaining at least a minute or so at Durham by the withdrawal of the Sunderland connection, might revert to its original starting time of 8.0 a.m.—an acceleration of 10 minutes. In addition to all these benefits, a new and useful "hourly" express would be provided at 7.17 a.m. from Newcastle to Sunderland, Hartlepool, Stockton, and Middlesbrough, the only contingent alteration being to start the 8.37 a.m. from Stockton to Middlesbrough two minutes later. Also the 8.9 a.m. from West Hartlepool to Leeds, which is slow as far as Stockton, would require to leave about 8.0 a.m., and would shunt at Stockton, leaving there for Leeds at 8.45 a.m., as at present. This arrangement, which would confer a really substantial benefit on all the important Tees-side towns, would actually be secured with a *reduction* in train mileage, the increase of 11½ miles in running the relief train *via* Stockton instead of Darlington being counterbalanced by 15 miles saved in cancelling the 7.33 a.m. from Sunderland to Durham.

"Safety First" and Accident Prevention.

THE sixth, and last, of the Fourth Series of Efficiency Meetings arranged by the "Underground" combination, was held on

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March 25, 1919, at the L.G.O.C. Training School, Chelsea, when Mr. H. E. Blain, Operating Manager, presided over an attendance of some 250 members of the Administrative and Control Staffs of the associated Undertakings. The Paper for the evening—"'Safety First'—The Progress and Possibilities of Accident Prevention Work," read by Mr. A. Winter Gray, revealed the fact that, during the two years' activities of the London "Safety First" Council, there had been a gratifying decrease in fatal accidents of 23·75 per cent., and in the total of accidents to persons or property of 35·58 per cent. Illustrations included cinematograph films and lantern slides, and the paper evoked an interesting discussion opened by (*a*) Mr. J. B. Mackinnon, General Traffic Superintendent London and Suburban Traction Company's group of Tramways; (*b*) Mr. A. Hutson, Assistant Divisional Inspector, L.G.O.C.; and (*c*) Mr. R. Johnston, Claims Assistant, Underground Railways, and London and Suburban Traction group of Tramways and taken part in by Messrs. Rolls, Salmon and Fowler.

Railway Literature.

RAILWAY YEAR BOOK, 1919. Price 5s. net. By post in the United Kingdom, 5s. 6d.; abroad, 5s. 7d. Railway Publishing Company, Ltd., 30, Fetter Lane, Fleet Street, London, E.C. 4. The twenty-second annual edition has now been published; and in view of the fact that transport in general, and railways in particular, at present occupy a leading position among the many pressing questions claiming the attention of the House of Commons and the British public, its publication will be welcomed, not only by those who have for a long course of years regularly subscribed to this standard railway reference work, but also by those who have not in the past paid the close attention to transport and railway matters their prime importance have undoubtedly merited. Indeed, it is possible that the passing of the Transport Bill now before Parliament will cause the home railways to be placed on a basis so widely different from that now prevailing, that the 1919 *Railway Year Book* may be the last compiled in its present familiar form. Future editions may require essential changes, but, in any case, the proposals before Parliament, while greatly adding to the value of the book as a work of railway reference, will, if carried into effect, enormously increase the worth of the present edition from an historical point of view.

In the new edition standard features of proved past usefulness are retained, having been carefully revised and brought down to date wherever necessary. The signing of the Armistice on November 11, 1918, with the consequent withdrawal of many restrictions, has permitted the inclusion of a considerable amount of information withheld during the progress of hostilities. Particulars of British railway-owned steamers, docks and harbours are again given. To the 49 articles descriptive of leading railways in the British Isles a new one has been added in regard to the Underground Electric Railways of London, Ltd. Three of the 38 maps have been re-drawn, and others have been altered to correspond with the present condition of the lines concerned. Many subscribers will doubtless find useful the section of the book that sets forth the chief Government regulations affecting railways which were in force at the date of the signing of the Armistice, and some of which have not yet been abrogated. New particulars concerning enlistment of railwaymen, and of ambulance trains supplied for the use of our own and the American forces, are included for reference purposes.

A page devoted to the Channel Tunnel sets forth the principal stages of development of this epoch-making undertaking, which happily now appears to be approaching fruition. A series of specially compiled tables supply comparisons between the 1914 and 1918 situations in regard to distances and fastest times between London and provincial towns, fastest schedules on leading railways, and length and numbers of notable non-stop runs. A table showing the development of the world's railways contains much useful information, while a series of diagrams sets forth the revised standard system of headlight indications now used for train classification. Particulars of rail motor cars, electric rolling stock and motor road vehicles owned by railway companies are reinstated and revised. The "Railway Miscellany," introduced last year, has proved a most acceptable feature, and is amplified and extended in the present edition. Many changes have occurred recently in railway personnel, and the revision and further extension of the valuable "Who's Who" section is considerable. Numerous fresh biographies are included, in addition to changes necessitated by new appointments, resignations, and the decease of several leading railway officers.

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MR. H. F. LONEY, who, as already announced, has been appointed Chief Goods Manager, Midland Railway, in succession to Mr. Henry Evans, entered the company's service in 1879 as junior clerk in the Coaching Department at Brecon, and was promoted to Derby (Superintendent's Office) in 1885. He was transferred to Leicester in 1887, and in 1890 returned to the Superintendent's Office at Derby. In 1891 he returned to Leicester as Coaching Inspector. In 1901 he was Assistant to the Bristol District Superintendent; from February, 1906, was Acting District Superintendent at Sheffield; in August, 1906, was appointed District Traffic Superintendent for South Wales; and from January 1, 1914, was Northern Divisional Outdoor Assistant to the Chief Goods Manager.

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MAJOR E. L. HALL, R.E., has been appointed an Inspecting Officer of the Railway Department of the Board of Trade, in place of Colonel Druitt, R.E., retired through ill-health. Major Hall joined the Royal Military Academy at Woolwich in 1900, and received a commission as Second Lieutenant, R.E., in 1901. He went through a course of mechanical training on the London and South Western Railway in 1903–4, and served abroad until 1908, when he became Assistant Instructor in the workshops of the School of Military Engineering at Chatham. In 1910 he became Assistant Instructor in electricity, and in 1913 was made Staff Captain under the Director of Fortifications and Works at the War Office, being engaged on electrical duties. In 1917 he was made Deputy Assistant Director under the Director of Fortifications and Works, mainly in connection with the supply of anti-aircraft searchlights and wireless telegraph equipment to the armies, which position he held until he went to the Board of Trade at the beginning of the present year. Colonel E. Druitt joined the Railway Department of the Board of Trade in September, 1900, being promoted Colonel from Major in 1904.

Mr. H. F. LONEY,

Chief Goods Manager, Midland Railway.

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NEW appointments have been made by the directors of the Midland Railway Company to date from May 1 as follows:—Mr. John Henry Follows, C.B.E., to be General Superintendent in the place of Lieut.-Colonel Cecil W. [illegible] Paget, C.M.G., D.S.O., resigned; Mr. Robert Whyte Reid, to be Carriage and Wagon Superintendent in the place of Mr. David Bain, C.B.E., retired; Mr. James Edward Anderson, to be Deputy Chief Mechanical Engineer.

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THE directors of the Rhymney Railway Company have appointed Mr. T. W. Stockwood Assistant General Manager. Mr. Stockwood has been with the Rhymney Railway since 1888, and for the past nine years has held the position of Assistant to the General Manager. Prior to entering the Rhymney service he was for some years with the Taff Vale Railway, leaving the

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MR. J. PEPPER,
Assistant Goods Manager, Midland Railway.

Traffic Manager's office of the latter company to join the staff of the former manager of the Rhymney Railway.

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MR. J. PEPPER, appointed Assistant Goods Manager, Midland Railway, in succession to Mr. William Todd, commenced his railway career on the Furness Railway, eventually becoming Advertising Inspector under the Superintendent of the Line. He then served for a time on the London and North Western Railway, and soon after the opening of the Lancashire, Derbyshire and East Coast Railway was attached to the General Manager's staff of that line. He then joined Messrs. Vickers, Limited, at Barrow-in-Furness, and in 1908 entered Midland Railway service in the Chief Goods Manager's department, where he was principally engaged in the reorganisation of goods terminal arrangements. In June, 1916, he was appointed London Outdoor Goods Manager, and in April, 1918, became London District Goods Manager.

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MR. HACKWOOD, appointed Goods Commercial Manager for London, Midland Railway, entered the company's service as a junior clerk in the Goods Department at Great Bridge in July, 1883, and was removed to Wednesbury in August, 1886. In September, 1891, he went to Derby to assist in the revision of rates brought about by the passing of the Rates and Charges Orders Confirmation Act of that year. In August, 1906, he was appointed Chief Clerk to the Bristol District Goods Manager, and was brought back to Derby in January, 1914, as Assistant Chief Rates Clerk in the Chief Goods Manager's Department. In March, 1915, he was made Liverpool Agent and Assistant to the District Goods Manager, and in March, 1918, received the appointment of Commercial Assistant to the London District Goods Manager.

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MR. FALCONER, appointed Goods Operating Superintendent for London, Midland Railway, entered the company's service in the Staff Office, Chief Goods Manager's Department, Derby, in July, 1896; went as Relief Clerk on the Sheffield District Goods Manager's Staff in April, 1903; returned to the Chief Goods Manager's Department, Derby, as Relief Clerk in June, 1909; became London Outdoor Goods Manager's Assistant in March, 1917; and was appointed Operative Assistant to the London District Goods Manager in April, 1918.

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MR. JAMES ARMSTRONG ROBINSON, recently appointed Chief Outdoor Assistant at Swindon to the Chief Mechanical Engineer, Great Western Railway, entered the service in 1870, as an apprentice at Chester. Two years after his apprenticeship he became Locomotive Foreman at Yeovil, and in 1885, District Foreman at Taunton. He held the post until 1894, when he was

MR. J. A. ROBINSON,
Chief Outdoor Assistant to the Chief Mechanical Engineer, G.W.R.

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appointed Assistant to the Superintendent at Newton Abbott, where in 1897, he was made Divisional Locomotive Superintendent. This post he occupied for nine months, and was then transferred to Wolverhampton as Works Manager and Divisional Locomotive Superintendent. In 1913, he was appointed Outdoor Assistant at Wolverhampton in addition to his other duties. Mr. Robinson is a brother of Mr. J. G. Robinson, Chief Mechanical Engineer of the Great Central Railway.

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MR. J. H. H. BAILEY, Chief Goods Manager's Department, Lancashire and Yorkshire Railway, has been appointed to succeed Mr. W. Slater as Deputy Assistant Goods Manager. He entered the company's service in 1895, and for three years has been acting as Transport Officer for the Ministry of Munitions in the North Western Area. Mr. William Slater retired on March 31, after a service extending to 53 years. On entering the Lancashire and Yorkshire service at Hoghton, near Preston, in 1866, he was appointed Goods and Passenger Clerk, and later the telegraph work was also added to his duties. In 1871 Mr. Slater was transferred to the Goods Department at Darwen, and from there, in 1873, to the District Goods Superintendent's Office at Bury. From Bury he was promoted, in 1881, to be Chief Claims Clerk in the Goods Manager's Office, Manchester; and later, the work in connection with outstanding accounts was placed under his immediate supervision. The necessary working up of statistical and other evidence for the inquiry which resulted in the Orders Confirmation Act, 1891–92, involved a great amount of work, and Mr. Slater acted as Chief Assistant in collecting information and data. In 1913 he became Deputy Assistant Goods Manager.

MR. J. H. H. BAILEY
Deputy Assistant Goods Manager,
Lancashire & Yorkshire Railway.

MR. H. I. BOND
London District Engineer,
London & South Western Railway.

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MR. H. I. BOND, appointed London District Engineer, London and South Western Railway, joined the service in 1900 in the District Engineer's Office at Clapham Junction, under Mr. A. W. Szlumper. After about two and a half years he was transferred to the Chief Engineer's Office at Waterloo. In 1904 he was attached to the Western District Engineer's Office under the late Mr. Grainger for a short period, and then took up work in connection with the Pneumatic Signalling under Mr. Annett at Wimbledon. He then returned to the Chief Engineer's Office at Waterloo to investigate the strength of bridges in connection with the Motor Car Acts and the increased weight of engines, and carried out work in connection with plans deposited before Parliament. In 1912 Mr. Bond was appointed Lighting Engineer under the Chief Engineer, and in 1914 was given, in addition, control of heating and water supplies. He took up his present position on January 1 last.

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H.M. THE KING OF THE BELGIANS has conferred upon Sir Herbert Walker, K.C.B., Acting Chairman of the Railway Executive Committee, and General Manager of the London and South Western Railway, the decoration of "Commander of the Order of Leopold II," in recognition of his valuable services to the cause of Belgium during the War.

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MR. G. C. MCDONALD, Engineer, Cambrian Railways, who, since January 1, has also been Acting Locomotive Superintendent, has now been definitely appointed by the directors to the dual position of Engineer and Locomotive Superintendent.

MR. A. CUNNINGTON
Lighting Engineer,
London & South Western Railway.

MR. A. CUNNINGTON, Lighting Engineer, London and South Western Railway, whose paper on "Some Notes on Railway Lighting and its Maintenance" is referred to in "Pertinent Paragraphs," was educated privately and at the City and Guilds Central Technical College, and graduated in science (engineering) at the London University in 1904. He was for several years assistant to Mr. L. Gaster, Consulting Lighting Engineer and founder of the Illuminating Engineering Society. After gaining a wide experience of lighting installations and accessories, he joined the Lighting Department of the London and South Western Railway Engineer's Office in 1912 as Technical Assistant, had charge of the Electric Lighting section from 1916, and was appointed Lighting Engineer in January last.

MAJOR PHILIP DAWSON, M.Inst.C.E., M.I.Mech.E., M.I.E.E., the well-known electrical engineer, has been created by the King of the Belgians a "Chevalier de l'Ordre de Leopold," in recognition of his services as a member of the Belgian Royal Commission on the electrification of the Belgian State Railways.

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HIS Majesty the King of the Belgians has conferred the following decorations upon officers of the Great Eastern Railway, in addition to the one bestowed on the general manager as recorded last month, for the "constant and generous help" given in the course of the war to Belgium: Mr. C. Busk, Continental Traffic Manager, "Officier de l'Ordre de la Couronne"; Mr. A. Barker, in charge of passenger section, Continental Department, and Mr. E. A. Stalley, in charge of Continental Department working at Tilbury and East India Docks, "Chevalier de l'ordre du Léopold II."

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THE RIGHT HON. LORD CLAUD HAMILTON, P.C., Chairman, Great Eastern Railway Company, has accepted the office of High Steward of the Borough of Harwich. Lord Claud has, since 1903, held a similar office with respect to Great Yarmouth.

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MR. JOHN WILKIE, of Glasgow, has been appointed District Traffic Superintendent of the southern section of the North British Railway at Carlisle.

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SIR JOHN A. F. ASPINALL, late General Manager, Lancashire and Yorkshire Railway, has joined the board of the recently consolidated English Electric Company, Limited, of which railway electrification work at home and abroad forms one of the most important departments.

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AT the request of Sir Eric Geddes, the directors of the North Eastern Railway have again lent the service of Mr. R. F. Dunnell to the Government for a temporary period. Mr. Dunnell is Secretary and Solicitor of the company, and his services are desired in connection with the organisation of the Secretarial and Legal Departments of the new Ministry of Ways and Communications.

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MR. A. ROBINSON, District Traffic Superintendent at Mirfield, Lancashire and Yorkshire Railway, since 1901, is retiring after a service of 52 years. He was appointed Goods Agent at Barnsley in 1879, and in 1890 was transferred to a similar position at Leeds.

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ON behalf of the Barrow Hæmatite Steel Company, Mr. G. Mure Ritchie, Chairman, recently presented to Mr. Alfred Aslett, late Secretary and General Manager, Furness Railway, a handsome silver Jardiniere, as a token of appreciation of services rendered during an association for a period of 23 years. In replying to Mr. Ritchie's speech, Mr. Aslett referred to the fact that the Furness Railway has, to a large extent, relied throughout its history upon the prosperity of the iron and steel and mining industries of the Furness district for its "living wage." No company or firm in this area, not even the great and expanding firm of Messrs. Vickers, brings so much grist to the Furness Railway mill as the Barrow Hæmatite Steel Company, and that has been the justification for the close co-operation which has existed. Mr. Aslett also mentioned the exceedingly friendly relations which have been maintained between Mr. Ritchie, Mr. A. Frank Mason(Secretary and Commercial Manager), Mr. List and Mr. Butchart, and himself during his occupancy of the leading executive positions on the Furness Railway, and which conclude 56 years of vigorous railway life.

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MR. HENRY EVANS, Chairman of the Concert Committee of the Railway Servants' Orphanage at Derby, and late Chief Goods Manager, Midland Railway, announces that as a result of the concert recently held at Derby, assisted by generous contributions from the Manchester, Leicester, Birmingham, Sheffield and other districts, the sum of £2,000 has been added to the Orphanage funds, while an Easter gift of 6d. will be handed to each child in the Institution. This makes a total of £5,000 raised for the Orphanage during the last three years.

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WE regret to record the death of Mr. John Macaulay, who retired from the position of General Manager, Alexandra (Newport and South Wales) Docks and Railway, in 1913. Mr. Macaulay was closely associated with the development of the dock and railway facilities at Newport. He was also well-known in naval circles by reason of his successful experiments in the storage of coal under water. Mr. Macaulay began railway life in the service of the North British Railway in 1866. The most important posts also held by Mr. Macaulay were those of Superintendent of Traffic in the South End of Liverpool, for the Cheshire Lines Committee; and as Manager of the Mersey Railway.

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MR. ROBERT DERBYSHIRE, Chief Goods Manager's Office, Great Central Railway, has retired after a continuous and unique service of 58½ years. Prior to the transfer of the office to London, Mr. Derbyshire was also local Honorary Secretary, Manchester District, to the Railway Servants' Orphanage (Railway Benevolent Institution) for about 20 years, and was well known there as the organiser of the very successful concerts at the Free Trade Hall, which resulted in very magnificent increases in the orphanage funds. A mural tablet in the building commemorates these "efforts." He is the author of "Derbyshire's Rapid-Simplex Calculator," a book of over 730 pages and 90,000 calculations.

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A SOUTH EASTERN AND CHATHAM RAILWAY STATION MASTERS' AND GOODS AGENTS' ASSOCIATION has been formed. The Association has come into being owing to the feeling that the grades of employees concerned should have a corporate body of their own with the right of access to the General Manager for the discussion of conditions of service. A deputation, therefore, had an interview with the General Manager, who met them very cordially, and told them that if the station-masters and agents agreed to form their own Association he would recognise them, and they could have access to him at any reasonable time. The result was a meeting at Maidstone and the formation of the Association. Subsequently a committee was set up at a meeting in London, at which various proposals were drawn up for submission to the General Manager. At a recent meeting it was announced that 172 members had already joined out of 211 eligible for membership, and that more were coming in.

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THE London and North Western Railway (London) Amateur Operatic and Dramatic Society was founded in 1913 and has since given 22 performances, whereby nearly £600 has been handed over to various war charities.

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MR. JOSEPH TATLOW presided at the annual dinner and concert of the Irish branch of the Railway Benevolent Institution, held recently at the Mansion House, Dublin. Mr. James Cowie, Manager, Midland Railway (Northern Counties Committee) replying to the toast of the evening, said that the income of the association for the year 1918 amounted to £4,672, as compared with £727 in the year following its foundation in 1892. During the years of the association's existence they had paid to 153 annuitants £15,031. The sums paid out in other forms of relief amounted to £15,032. There were now 99 annuitants and 16 orphans on the funds.

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THE Great Eastern Railway Musical Society held its 79th concert in the Hamilton Hall of the Great Eastern Railway Hotel, Liverpool Street, on the evening of Wednesday, April 2. The chair was taken by the Right Hon. Lord Claud Hamilton, Chairman of the railway and President of the society, who referred to the fact that this was the first concert the society had held in the Hamilton Hall since the outbreak of the war. There was a large and enthusiastic gathering, who evidently welcomed with pleasure the return of the musical society to its pre-war conditions. During the evening Major-General Sir Henry W. Thornton, General Manager, proposed a vote of thanks to Lord Claud Hamilton for presiding, and took the opportunity of presenting to him on behalf of the society an enlarged photograph of the Great Eastern Railway ss. *Brussels* (of which the late Captain Fryatt was at one time the Commander), lying partly submerged in the harbour at Zeebrugge, the action of the Germans before they evacuated in November, 1918. Sir Henry mentioned that immediately following the outbreak of the war the society's usual activities were suspended. It had been found necessary to temporarily disband the male voice choir, but by the return of members of the orchestra wounded and the inclusion of lady members, it became possible for the orchestra, after a little time, to carry on. They had been giving a number of concerts to His Majesty's Forces at various military and naval depôts, hospitals, &c. Lord Claud Hamilton, in response, congratulated the orchestra on the quality of their performances and paid a high tribute to the zeal and enthusiasm of the society's honorary conductor, Colonel William Johnson Galloway who briefly responded.

"RAILWAY STATION DESIGN" formed the subject of a paper read by Major N. B. Foster at a meeting of the Railway Club held on Tuesday, April 1. Treatment was of a comprehensive character, and led to an interesting and instructive discussion. On May 6 Mr. Cecil J. Allen will deal with "Some Post-War Travel Suggestions." The Annual Dinner will be held on Friday, May 9.

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IN order to form a new hostel for guards at Southampton, in place of the old sleeping quarters in Anglesea Terrace, the London and South Western Railway has acquired and adapted two houses in 81, Lawrence Road, opposite the goods yard. Premises include messroom, 16 bed-rooms and all necessary conveniences.

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THE Board of Trade have recently confirmed the following Order made by the Light Railway Commissioners:—Hooton Light Railways Order, 1919, authorising the construction of light railways in the parishes of Little Sutton of Overpool and of Netherpool, in the county of Chester.

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THE Newhaven-Dieppe continental service, London, Brighton and South Coast and French State (Western) Railways is to be reopened for passenger traffic on June 1. The British military authorities after demobilisation will permit the ferry boat to be used for commercial purposes.

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THE LONDON AND SOUTH WESTERN RAILWAY brought into use on April 9 ascending and descending escalators for giving a more direct access between the main station level at Waterloo and the underground for the City Railway. Between the two

MEMBERS OF THE METROPOLITAN GOODS CONFERENCE ON TRAIN FERRY No. 2 AT SOUTHAMPTON.

Mr. G. T. Hedge, Outdoor Goods Manager, London and South Western Railway, in the centre.

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escalators a fixed stairway is provided. Constructional work in connection with these escalators and the approaches thereto has been carried out by the railway staff. To provide the well for the escalators a portion of the arching upon which the station is built had to be removed and steel girders encased with concrete provided to take the thrust of the remaining arches. Joiners' work encasing in mahogany the various parts of the running gear is worthy of attention; it was all made at the company's carriage works at Eastleigh. Height of the escalators is 26 ft.; electric current is derived from the power house at Earlsfield, via the sub-station at Waterloo. The motors are duplicated, and, if necessary, can be instantaneously stopped by the attendant without having recourse to the switchboard. The machinery and moving parts were provided and fixed by the Waygood Otis Company.

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On February 25 a continental train was again run to Parkeston for the Hook of Holland and Antwerp boats, leaving Liverpool Street at 4.55 p.m. and arriving at 6.35 p.m., only 10 minutes slower than the 8.30 p.m. and 8.40 p.m. pre-war expresses. There was only one train for the two services and that a short one only to run twice a week, but it was a revival. It conveyed a large number of mailbags. Until the fast passenger steamers are released from Admiralty work and re-conditioned no great improvement in Great Eastern Railway continental service can be made, but they are, as they have been throughout the war, still running. The offices at Antwerp and Brussels have been re-opened, larger offices taken in the latter town, and fine offices have been taken in Paris.

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In connection with the Grand National events at Aintree, the first run under normal conditions since 1915, although there were no special trains beyond those run locally, these carried an enormous traffic, as the attendance was a record, due, in part, to the presence of Sir David Beatty, and three of his warships—the *Queen Elizabeth*, *Tiger* and *Princess Royal*—being in the Mersey and, partly to the revival, under happier conditions, of a most popular social event. The Lancashire and Yorkshire carried 36,000 passengers from Liverpool alone, and, in connection with the railway side of this event, an interesting feature, as showing how the smaller companies help the bigger, was the restoration of the pre-war service over the Liverpool Overhead and the Lancashire and Yorkshire Railways to Aintree. By this route 3,000 passengers were carried in six trains, and many more would have been conveyed but that it was found necessary to stop booking at 1 p.m.

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Post-War development, or rather redevelopment, of railway facilities is now proceeding in earnest, and many important improvements are announced by various railways. On the Great Northern Railway an additional train leaves King's Cross at 7.45 a.m. for stations to Peterborough; the 8.45 a.m. is altered and accelerated; the 10 a.m. for Scotland is re-timed to reach Grantham at 12.15 p.m. and York at 2.6 p.m.; the 1.40 p.m. ex King's Cross has ceased to call at Doncaster; the 7 p.m. Scotch express (except Saturdays) is due to arrive Grantham 9.15 p.m., and after calling at Newark and Retford to reach York at 11.14 p.m.; the 8.25 p.m. is re-timed, while the 10.15 p.m. is altered to 10.30 p.m., Grantham arr. 12.48 a.m., York arr. 2.39 a.m., and the 10.30 p.m. altered to 10.45 p.m., reaching York 3.4 a.m. (Saturdays excepted) with calls at Peterborough and Grantham. In the up direction an additional sleeping car train from Newcastle is due at King's Cross, 5.40 a.m., and the principal Scotch trains are re-timed substantially as on the down journey. On various routes many additional and altered trains are announced. Cotham station, between Newark and Elton, has been reopened for passenger and parcels traffic.

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On the North Eastern Railway principal interest in regard to train improvements for April attaches to the Anglo-Scottish services. In conjunction with alterations on the Great Northern Railway above referred to, and on the North British Railway, the journey times by East Coast route are materially improved. By the 10.45 p.m. ex King's Cross, Newcastle is reached at 5.5 a.m., the call at York being to set down only. The 10.30 p.m. is also non-stop between York (dep. 2.49 a.m.) and Newcastle (4.32 a.m. arr.). The 8.55 a.m. from Leeds is non-stop York to Newcastle in 97 min. The 10 a.m. from King's Cross is likewise non-stop York to Newcastle (102 min.); the 7 p.m. in 111 min. Coming South the 6.35 p.m. ex Aberdeen is non-stop in 106 min. Newcastle to York. Most other expresses call at Darlington, and those whose principal destination or starting point is Newcastle make one or more other calls between York and Newcastle. Between Newcastle and Edinburgh the non-stop trains are the 7 p.m. and 10.30 p.m. from London, with the 8.55 a.m. from Leeds (152 min.) going north, and the 10 p.m. from Waverley except for a conditional call at Dunbar. The 6.35 p.m.

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ex Aberdeen is not booked publicly to call at Waverley, but it stops at Berwick to pick up. The general result is that the standard time between Edinburgh and London is now 9 hours by East Coast route, and most of the principal services, including others for London-Newcastle traffic, now have restaurant or sleeping car facilities as required. Incidental improvements are also involved, both on main and branch lines, and a few additional expresses run on secondary routes, as between York and Scarborough, and the Stockton and Sunderland route for inter-town expresses.

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NORTH BRITISH Railway alterations include the following, in conjunction with remarks concerning improvements affecting the Great Northern and North Eastern Railways already referred to. The 7 p.m. from Edinburgh to Berwick leaves at 6.45 p.m., and the 9, 9.30 and 9.50 p.m. at 9.40, 10 and 10.20 p.m. respectively. On the Carlisle line new trains leave Edinburgh at 2.35 p.m., and Carlisle at 9.30 a.m., while a number of others are altered and re-timed. The Naval Leave train from Thurso at 11.45 a.m. leaves Waverley for the south at 12.31 a.m. and calls only for engine purposes at Galashiels, reaching Carlisle at 3.10 a.m. Other expresses call at Galashiels and Hawick, and in some instances at certain other stations. The down naval leave train (Euston dep. 6. p.m.) leaves Carlisle at 12.40 a.m., and is due at Waverley 3.18 a.m., calling at Galashiels for engine purposes. New expresses and other trains are provided on the Edinburgh and Glasgow, West Highland and other routes, some of those previously operated being altered and accelerated.

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COMMENCING April 4th, the North British Railway now operates restaurant cars on the following trains: 10 a.m. train, Edinburgh to King's Cross and *vice versa*; 8.20 a.m., 10.20 a.m. and 6.5 p.m. trains, Edinburgh to Aberdeen; 12.50 p.m. and 3.40 p.m., Aberdeen to Edinburgh; 6.35 p.m. train, Aberdeen to London (dinner served between Aberdeen and Edinburgh); 1.5 p.m and 4 p.m. trains, Edinburgh to Glasgow, and 1 p.m. and 4 p.m., Glasgow to Edinburgh. On Sundays restaurant cars are attached to the 8.20 a.m., Edinburgh to Aberdeen (through train from St. Pancras), and the 2.10 p.m. train, Aberdeen to Edinburgh.

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PASSENGER train vehicles on the Great Eastern Railway are now being painted a rich lake colour, very similar to that characteristic of Midland rolling-stock. The effect, both for main line and suburban trains, is very pleasing. A number of vehicles and several complete sets of coaches thus painted are now in service.

* * *

ROYTON station, Lancashire and Yorkshire Railway, has been reopened for passenger traffic and train services between Middleton Junction, Oldham and Royton reinstated, the Manchester, Oldham and Rochdale services being revised. The section between Great Harwood and Simonstone has been closed.

* * *

MANY additional trains are now running on the Great Eastern Railway, both main line and suburban. Branches more particularly affected are the Chingford, Enfield and Romford lines. Sunday trains have been put on in some instances; while a new train is now running in the afternoon from Chingford to Liverpool Street, with a corresponding train in the opposite direction. Trowse station, closed for the war, has been reopened for passenger traffic.

* * *

IMPROVED facilities are now in operation on the "Piccadilly" section of the London Electric Railway, the service having been increased from 18 to 24 trains per hour between 10 a.m. and 5 p.m., with a corresponding improvement in the after-theatre service. This additional accommodation should help materially to relieve congestion.

* * *

Increase in operating expenses due to the shorter working hours for railwaymen and certain sections of transport workers, in addition to the enhanced cost of materials for maintenance, has made it necessary to make revisions in fares applying to the Underground Railways and London General Omnibus services. Commencing March 27, the first alterations became operative on certain motor-bus routes. On April 6, certain fares on the District, Bakerloo, Piccadilly, Hampstead, Central London, and City and South London Railways, were revised, and on April 9, a number of through bookings between the buses and railways were altered. Revision in certain season ticket rates on all the Tube railways is contemplated.

* * *

ADDITIONS to North London Railway electric train services are to start from May 5, including more expresses between Broad Street and Acton and Richmond.

* * *

A UNIFORM fare of 1½d. is now imposed by the Glasgow Subway (Cable) Railway.

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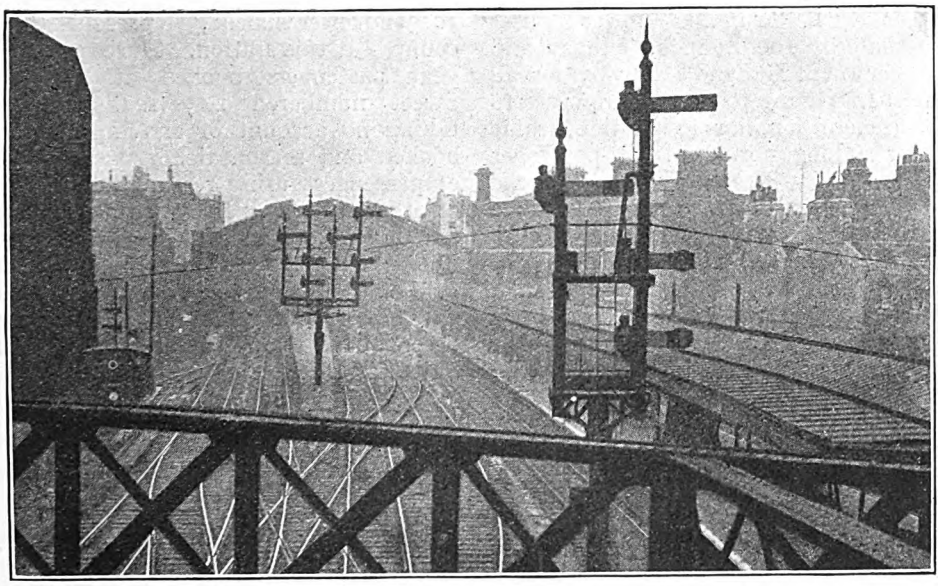

GENERAL VIEW OF STATION FROM BRIDGE CARRYING SIGNAL CABIN.

Notable Railway Stations and their Traffic.

FENCHURCH STREET, GREAT EASTERN RAILWAY.

By J. F. GAIRNS.

PROBABLY least known of all the greater railway stations in London, Fenchurch Street is actually a busy centre of traffic, dealing with more than 500 trains and some 40,000 to 50,000 passengers daily. It was, moreover, as successor to the short-lived Minories terminus of the old London and Blackwall Railway, the first railway station to be located within the boundaries of the City of London, and for upwards of 20 years was the only City station which could be correctly so styled.

From the traffic point of view the history of Fenchurch Street Station is interesting. Opened in 1841 as the terminus and headquarters of the London and Blackwall Railway [see Mr. H. L. Hopwood's article, entitled "Off the Beaten (Railway) Track in London," RAILWAY MAGAZINE, February, 1919], with the completion of the extension line from Stepney to Bow it was used from 1849 also by Eastern Counties (now Great Eastern) Railway trains, until it gradually became the principal terminus for their suburban services. From 1851 to 1866 it was also the City terminus for North London Railway trains; and from 1854 the London, Tilbury and Southend Railway (worked by the Eastern Counties—Great Eastern Railway until 1877 for rolling stock, and 1880 for locomotives) made the station its headquarters. Commencing January 1, 1866, the Great Eastern Railway took over the London and Blackwall Railway, under a 999 years' lease, and following the opening of the Dalston Junction—Broad Street line in 1865, the North London Railway transferred its services to their new City terminus. Since then Fenchurch Street has ranked as a Great Eastern terminus for suburban trains, the principal one until the opening of the Liverpool Street extension was followed by a gradual concentration of that traffic at the new station, so that Fenchurch Street now occupies a secondary,

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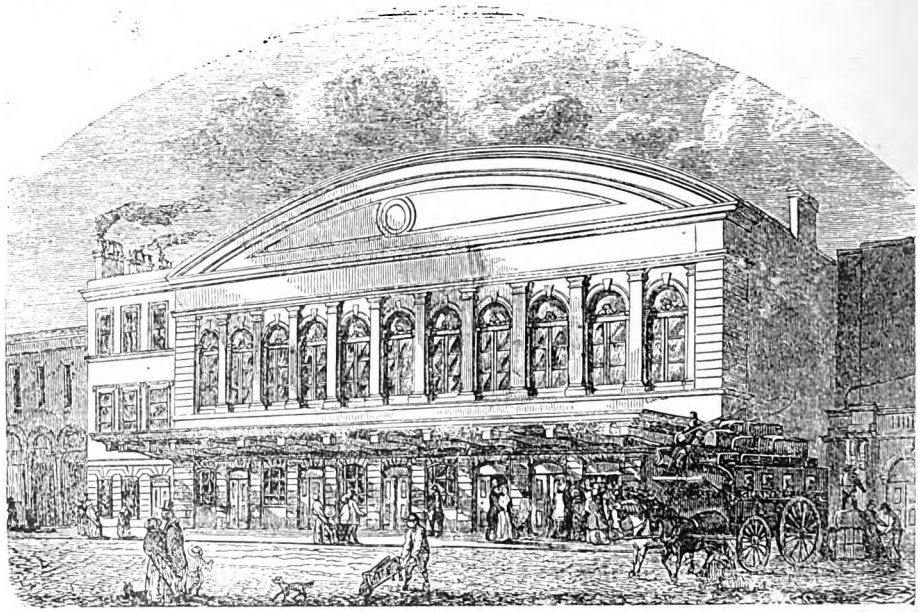
though by no means unimportant position; together with "running power" user (perpetual) by the London, Tilbury and Southend (now Midland) Railway for all traffic. In regard to the "Tilbury," to use its general familiar designation, traffic was for a long period of all passenger varieties, but with the opening of the Whitechapel and Bow Railway in 1902 (jointly owner with the Metropolitan District Railway), and electrification of local lines since 1904, there has been a gradual transference of the very busy local traffic to the underground lines. But contemporaneously a huge residential traffic to Southend, Westcliff and Leigh has developed, with considerable increases in traffic to and from Tilbury Docks, so that this system now requires its full train capacity at Fenchurch Street for services of a relatively main-line character, and even then the resources of the station are severely taxed.



FENCHURCH STREET STATION IN 1857.
(From an old woodcut.)

As evidence of the traffic at Fenchurch Street it may be mentioned that, in 1913, 560 trains were dealt with daily at the five platforms available, and the numbers are not very greatly less now, seeing that neither of the railways concerned could seriously reduce its trains even to meet war requirements. One day in October, 1913, no fewer than 48,386 passengers were counted at this station. During the same year passengers booked at Fenchurch Street numbered 1,978,124, this total taking no account of arriving, through-booked and season ticket passengers, or of passengers using return tickets issued at other stations. In 1918 total bookings had fallen to 1,220,215, a slight increase upon the figure for 1917; but this was in face of the 50 per cent. increase in fares, and consequent reduction of traffic and diversion to tramways and motor omnibuses, additional issue of season tickets, absence of holiday traffic, and increase in military, naval, and Government traffic passing under warrant. Actually passengers have probably been more numerous during the later years of the war, in view of the important dock, riverside and industrial districts whose traffic is so largely dealt with at Fenchurch Street.

With a fine arched roof covering four of the five platforms, and on the high level, Fenchurch Street would rank as a notable station building, though it is not architecturally distinctive, were it located fronting a main thoroughfare and adequately displayed. It is, however, hidden

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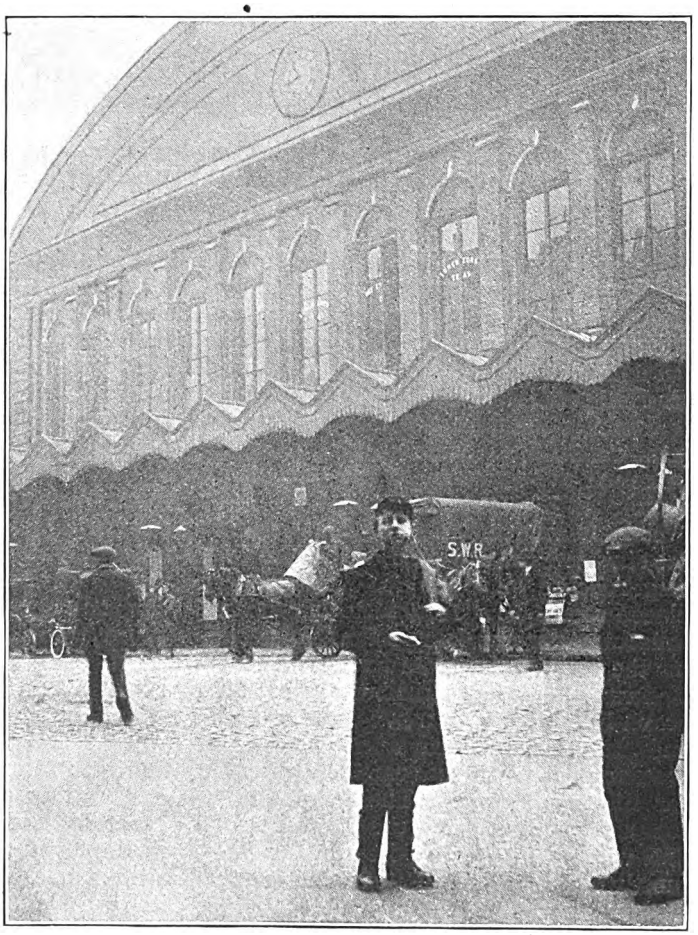
more or less by City buildings, and the angular approaches by two somewhat narrow thoroughfares from Fenchurch Street, by Little London Street from Mark Lane, and by a flight of steps from Hart Street, prevent any display of the imposing though very plain façade. There is, indeed, no proper station yard, beyond a limited court at the junction of the streets mentioned, cabs and other vehicles pulling up alongside a stretch of pavement sheltered by a glazed verandah, but otherwise in continuation of the paving of approach thoroughfares. The façade is distinguished only by the series of high windows serving premises on rail level, and the big central clock face.

From the verandah-covered pavement, which extends the whole width of the station, a series of doors open into the booking halls. Both are somewhat dark in the daytime, as the girder-supported ceiling is not very high. In the main booking hall are four ticket windows, usually reserved for Great Eastern issues, but at present including also provision for "Tilbury" traffic. To the left is a smaller booking hall with three windows, in normal times reserved for "Tilbury" issues, but at present closed. At the right-hand side of the main hall is a double staircase leading to the circulating area above; but on the left are two single staircases, one ascending directly from the booking hall, the other with a level intermediate portion, so that it is extended to lead directly from the station yard. Other equipment on ground level includes a left luggage and cloak room, lavatories, and access to a hair-dressing saloon. There are also hydraulic lifts for transferring parcels and luggage to the platform level.

Proceeding upstairs, four platforms only are visible, as No. 5 is formed as a bay to the outer portion of No. 4. Behind the hydraulic buffer stops of Nos. 1 and 2 is a bookstall, while a tea-room and telegraph office similarly back Nos. 3 and 4 and the middle engine road between them. Opposite these are the refreshment rooms, with general and ladies' second-class waiting rooms alongside. In one corner is a left luggage and cloak-room in conjunction with the one below, and connected therewith by the two lifts before referred to; while a passage leads to the ladies' first-class waiting room. This is a notable apartment, with high ornamented ceiling and artistic cabinet work. It was at one



GENERAL VIEW OF STATION AND COURTYARD.

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No. 4 is an engine road, with crossovers near the buffer stops, and, as a rule, an arriving engine proceeds direct thereto from the buffer stops. whether it is going to remain on the middle road, as is frequently done, or goes to the engine track outside the station, instead of following a train out as usual. This platform is now used on Sundays for Woolwich line trains, as it enables an engine to run round its coaches, thus saving a spare locomotive, as necessitated by the usual Woolwich platform, No. 5. Advantage of this running round facility in No. 3 is occasionally taken for special traffic. A few "Tilbury" trains are also dealt with on this line, and in some instances Loughton line trains are diverted to No. 2 to free No. 3 for this purpose.

No. 4 is reserved exclusively for "Tilbury" line trains, and it is, and need be, the longest of all, 760 ft. Even with 13 bogie coaches it is necessary to slightly vary the route by which engines back on to trains, and yet, at busy periods, this make-up could advantageously be increased to deal with the enormous Southend residential traffic. As it is, No. 4 is, by far, the busiest platform in the station, for at times of pressure trains are run in and out as quickly as they can be dealt with. For Southend, Leigh and Westcliff alone the ordinary evening pressure involves departures at 4.57, 5.6, 5.16, 5.25, 5.38, 5.46, 6.7, 6.17, and 6.26 p.m., with interpolated trains for other destinations at 5.32 5.55, and 6.7 p.m., all dealt with at this platform. Similarly, in the morning, there are arrivals at 8.6, 8.15, 8.24, 8.33, 8.44, 8.53 (at No. 3), 9.4, 9.10, 9.17, 9.30, 9.34 (at No. 3), 9.39, 9.50, and 10.2 a.m. Except as noted these are all dealt with at No. 4, but it will easily be understood that when relief can be had by using No. 3 it is extremely valuable. It must be remembered that as this traffic is often of a main line character, though attaching and detaching of carriages and horseboxes and like movements are not involved at Fenchurch Street, the work is heavier than when purely local trains are concerned. There is also a considerable amount of heavy parcels, fish, fruit, and vegetable traffic associated with these trains; while both in peace-time and during the war numerous specials are required in connection with steamer traffic (especially emigrant, and in normal summers, excursion) at Tilbury docks. "Tilbury" spare engines always stand in the middle road, backing to the buffer stops if necessary to clear the inner crossovers for a Loughton spare engine,

STARTING SIGNALS, No. 4 PLATFORM, SHOWING SIGNAL CABIN.

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or to take water from water cranes there provided.

Along No. 4 is a bookstall, but there is not much room for general station premises. A little way beyond the overall roof is the stairway from the John Street entrance to the station, which thus gives access only to platforms Nos. 4 and 5. This entrance is formed in a building which also accommodates the offices of the London and Blackwall Railway, and above, those of the Midland (London, Tilbury and Southend Section) Railway. There is a booking office on ground level. Grouped round the stairway on platform level are lavatories, and small general and ladies' waiting rooms.

No. 5 platform forms a bay to the outer portion of No. 4. As it is entirely beyond the overall roof it is protected by umbrella shelters. Length is 477 ft., and Woolwich and Royal Albert Docks trains are dealt with. The spare engine line is just beyond the platform. This track, together with one reserved for Loughton spare engines when they do not remain on the middle road, both lead to a turntable. This is not, however, now used as such, but as the track accommodation of the Goodman's Yard depot and warehouses immediately adjoining the station is somewhat limited, it is occasionally useful to employ the turntable to direct engines into the terminus, and so release them or enable them to reach the other end of the yard. Several huts for foreman porters, carriage cleaners, &c., are located on No. 5 platform. At its further extremity a staircase leads to a footbridge giving access to the big signal cabin which serves the station.

The station was originally laid out with short platforms suited to trains of the period, but extensions have rendered the outer portions confined, and with somewhat restricted track connections. In early days there was a platform between Nos. 1 and 2—presumably the present No. 1 platform did not exist, but this the writer has been unable to ascertain definitely.

In North London days these trains used No. 1 platform, and one of the curiosities relating to that period is a notice-board, bearing the following inscription: "The express train for the Hampstead and Kew Line is at the end of the platform." Reference is to a mode of working whereby combined Hampstead and Kew "express" and Chalk Farm local trains were operated. These divided on the steep bank leading down from Gas Factory Junction to Bow North London station. The front portion went on express, while the rear portion was allowed to run down by gravity to Bow station, where another engine was attached for the stopping journey to Chalk Farm.

Following the withdrawal of North London trains in 1866, a service of short Great Eastern trains was run between Fenchurch Street and Bow (North London) these running half-hourly from No. 2 platform, which otherwise had only hourly Forest Gate trains in addition. Rebuilding of Bow Road Station, with direct staircases to the North London Station adjacent, caused this service to be withdrawn, and for a time it was replaced by locals to and from Stratford Market. This did not last for very long, and gave place to amplified Ilford line trains. For a long period the principal Great Eastern services were those to and from the Loughton branch. Certain trains, such as the 4.36 p.m. (Mark Lane express) and 5.58 p.m. on this route, can be considered as the lineal descendants of the chief business expresses which once served the "aristocratic" districts of Leytonstone, Snaresbrook, and Woodford. Present-day Great Eastern suburban traffic at Fenchurch Street is fairly heavy, though it will not compare in any degree with that at Liverpool Street; but it is further important in that Stepney (junction with the Blackwall route) and other stations on the Fenchurch Street line, call for considerable residential traffic provision, while the terminus is very convenient for some parts of the City. In the case of the Woolwich line the bulk of the City traffic is dealt with at Fenchurch Street, including through trains, some fast, to the Royal Albert Docks.

Before dealing with the signalling, some reference must be made to the track lay-out between Fenchurch Street and Stepney. In early days it was two-track only, but later an additional up-road was put in, used by the Loughton, Woolwich and Tilbury trains, which were not scheduled to call at the intermediate stations, Shadwell and Leman Street, where no platform was available on this line. In

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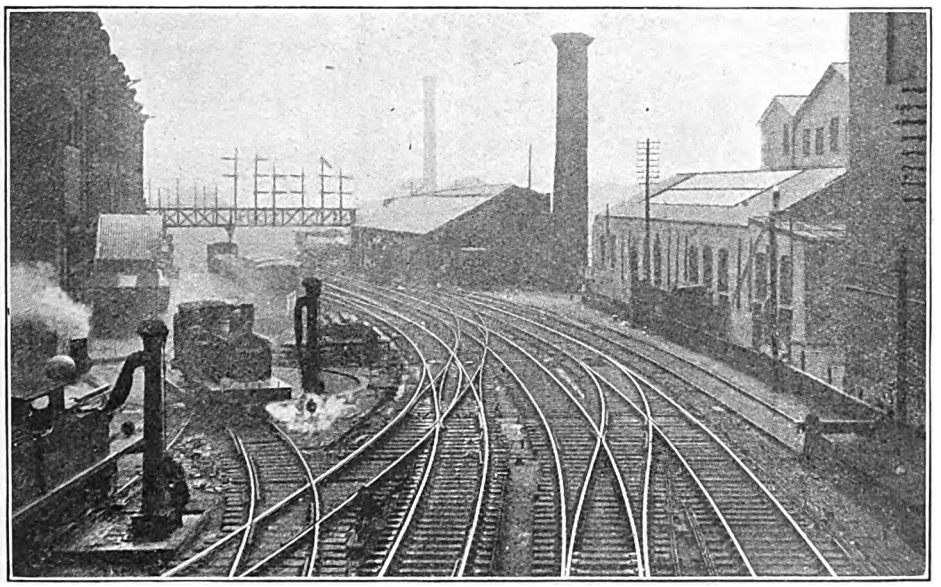
1894-5 this section was widened and stations rebuilt, so that there are two slow lines serving Shadwell and Leman Street (both stations closed during the war period, though Shadwell was reopened on May 5) and two fast lines. Woolwich and "Tilbury" trains mainly use the fast lines; Loughton's divide their favours according to traffic convenience; and Ilford and Blackwall trains are confined to the slow lines.

Within a distance of little more than a quarter of a mile from the terminus is a remarkable combination of goods depôts. Behind Leman Street Station is the great Eastern Goodman's Yard warehouse, bonded vaults, &c. These together account for heavy traffic, and yet all are concentrated within a very limited area. Reckoning the Tilbury and Midland depôts as belonging to distinct railways, which they were prior to the amalgamation, and still are for traffic purposes, there are thus six railways concerned: Great Eastern (two sections), "Tilbury," Midland, Great Northern, London and North Western and North London.

Signalling is mechanical, according to standard Great Eastern patterns, and with Saxby and Farmer instruments co-



APPROACH LINES AS SEEN FROM SIGNAL CABIN.
To the left, Goodman's Yard depot and yard (G.E.R.), with Woolwich and Loughton spare engines; to the right, Royal Mint Street depots, Great Northern and Midland Railways. Showing also signal gantry controlling admission to terminus.

Commercial Road depôt of the Midland (London, Tilbury and Southend section) Railway, and this is served only by the fast lines. At the City end of Leman Street station is a branch from the slow lines leading to the London Docks, and served by Great Eastern goods trains. Immediately beyond are the Midland and Great Northern Royal Mint Street depôts, also reached from the slow lines. On the fast side are, first, the London and North Western Railway branch into Haydon Square depôt, usually worked by North London engines; and secondly, the Great operating with lock and block treadles, and other usual safeguards. Station work is controlled by one cabin, having 115 working levers, and placed on an overhead triangular girder structure extending from the end of No. 4 platform, the box itself being placed on the up slow side, and parallel to and slightly overhanging that line. Outside the station is the Haydon Square cabin (45 levers), and this takes a share in controlling the approaches to the station. The Fenchurch Street station-master's jurisdiction extends as far as Christian Street cabin (40 levers), halfway

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between Leman Street and Shadwell stations, and includes that signal box, together with Leman Street (40 levers). Between them these cabins control all the special goods traffic working involved by the various depôts adjacent to Fenchurch Street, together with the Cable Street coal depôt, close to Christian Street box.

Departure signals at Fenchurch Street are grouped on four bracket posts, serving respectively No. 1, Nos. 2 and 3, No. 4 and No. 5 platforms. Each includes a high arm governing egress to the down fast line; a lower one on a separate doll to down slow line, and subsidiary arms to engine bay, carriage siding (outside the station in extension of Goodman's Yard sidings), and for wrong road shunting, those for Nos. 2 and 3 being in one combined structure. Discs for secondary movements, and a ground frame for the crossovers at the buffer stop ends of Nos. 3 and 4 platforms and the middle road, complete the signal equipment.

Immediately outside the terminus is a gantry spanning all lines. and this carries the up home signals controlling access to the station, there being two-arm and three-arm dolls for both up slow and up fast roads, governing entrance respectively to platforms Nos. 1 and 2, and 3, 4 and 5, together with dolls carrying the respective down advance starters, each with a distant below it. A short distance beyond, a similar gantry carries the principal Haydon Square signals. This has nine dolls of varying heights, and reading from left to right, looking from Fenchurch Street, these carry arms as follows:—(1) down fast and distant; (2) up fast to Haydon Square goods; (3) spare; (4) up fast, with distant applying to any of the plat-

MR. A. J. GREEN, STATIONMASTER, FENCHURCH STREET.

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form splitting signals on the station gantry before referred to; (5) down slow and distant below it; (6) up slow to Goodman's yard sidings; (7) up slow, with distant for all splitting signals; (8) Royal Mint Street (Great Northern) departure to down slow; and (9) up slow to Royal Mint Street, Great Northern. Level with this gantry, but at a lower level, are signals controlling down movements in Goodman's Yard sidings, across the Haydon Square branch, and to down fast and slow lines for exit. At Leman Street the up slow line has a three-doll bracket post at the starting end of the station—(1) up slow and distant, (2) up slow to Great Northern depôt, and (3) up slow to London Docks branch and Midland Royal Mint Street depôt. Other signals involved in this area need not be set forth in detail.

Staff employed under the stationmaster at Fenchurch Street includes 17 booking-office and parcels clerks, 2 inspectors, 4 platform porters, 21 male and 4 female ticket collectors, 4 women waiting room attendants, 3 passenger guards, 3 porter guards, 2 yard shunters, 2 pointsmen (for the ground frame), 1 yardman, 2 liftmen, 1 luggage foreman, 3 parcel porters, 2 cloak room porters, 29 platform porters, 3 women carriage cleaners, 14 signalmen, and 2 signal-box lads. In the station signal cabin work is divided between five signalmen, in three eight-hour shifts. Two head signalmen direct respectively the 6 a.m. to 2 p.m., and 2 p.m. to 10 p.m. periods of duty, and three assistant signalmen work round these duties, and take the 10 p.m. to 6 a.m. shift single-handed.

Mr. A. J. Green, stationmaster since 1912, has a record of over 41 years' service with the Great Eastern Railway. Commencing as a telegraph lad and booking clerk at Bishops Stortford in 1877, he was appointed booking clerk at Chingford in 1882, transferring to Stratford in 1883. He remained there until 1897, when he was appointed stationmaster at Limehouse, whence he went to Burdett Road in 1901. In 1908 oversight of Bow Road was added to his duties, and in 1912 he came to Fenchurch Street.

The writer is indebted to officers of the Great Eastern Railway and to Mr. Green for information utilised in this article, together with facilities for inspection, and for taking photographs reproduced.

The *Railway Year-book*, for 1919 (Railway Publishing Company, Limited, pp. 360, 5s. net), is aptly described as the Whitaker of the railway world. Home railways naturally receive most attention in its pages—each having its history sketched and a quantity of miscellaneous information given in reference to it—but undertakings in other countries which interest people here are not neglected. Special care has been taken to supply the names and biographies of the chief officials, and, of course, the constitution of the various directorates is shown. Important events in the railway world from the earliest times until now are also set out in what may be called the almanac section of the book—*The Manchester Guardian.*

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The New Marine Station at Dover.

COMPLETION OF THE GREAT UNDERTAKING, AND ITS RECORD DURING THE WAR PERIOD.

IT is only as a result of the war that the general travelling public has not yet made acquaintance with the magnificent station now provided at Dover for cross-Channel passengers. The new marine station represents the culmination of improvement works contemplated for many years, but delayed owing to the peculiar conditions existing at Dover, in that the Admiralty and the Dover Harbour Board were primarily concerned, the position of the railway being relatively a secondary one. However, the various difficulties had been overcome, and the greater part of the work had been completed on the outbreak of war in 1914. Then came the fateful day when the public were, in national interests, forbidden the station, Dover itself becoming an enclosed military area, so that completion of the station and associated works, together with its valuable and extensive use for military and Government traffic during the war, have proceeded more or less unseen and generally unknown. Now, however, the veil can be lifted, and the main features of this important work set forth in conjunction with interesting illustrations reproduced.

The basis of the scheme is the reclamation of 11¾ acres on the east side of the Admiralty Pier. This devolved upon the Dover Harbour Board, and eventually cost about £400,000. This reclaimed area, about 2,300 ft. long, with a maximum width of 370 ft., was obtained by building a sea wall of concrete blocks and then filling in the enclosed space with chalk. Through the chalk filling nearly 1,200 reinforced concrete piles were driven down to the sea bed, and these form a basis of a reinforced concrete structure upon which the station has been built up. This area includes the new quay, the station proper, and a carriage shed.

The quay alongside the station has a total length of over 2,000 ft. and a width of 43 ft. Rails are provided for four eight-ton electric travelling cranes for transferring boxes of registered luggage between train and steamer. Ordinary luggage, mails and motor cars can also be dealt with in the same way. Alongside the quay wall there are three passenger berths and landing stages. Awnings extend as far as possible from the outer wall of the station, and across the quay, towards the boats, in order to give shelter to passengers. The chief berth (No. 2) for the Calais steamers, is reached by a ramp at the seaward end of each of the station platforms. Distance between the point where the passengers will step ashore at this berth, and the nearer of the two ramps is only about 80 ft. The other berths are equally convenient of access. A coaling berth with two 4-ton electric travelling cranes serving it is also provided. There is good depth of water alongside the quay wall, and a small amount of dredging will suffice to maintain a minimum of 16 ft. at low water of spring tides.

The station proper has been designed as a steel-framed structure with brick sides and granite dressings, while the front of the station is faced entirely with panels. Area covered is about 3 acres. There are two island platforms, each 700 ft. long and 60 ft. wide, and accommodation is thus afforded for the loading or unloading of four trains simultaneously. On the platforms there are three blocks of brick buildings, each 100 ft. in length and 25 ft. in width. These buildings include waiting rooms, tea rooms, dining and refreshment rooms, parcels room, railway offices, and so on. At the end of the platform nearest to the old Admiralty Pier, provision has been made for a Post Office, and at the end of the other platform there is a Customs Examination Shed, 450 ft. long and 55 ft. wide. Registered luggage for Paris or London respectively is usually packed in box-containers at the point of despatch and carried through to destination, undergoing examination at

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the other end; but hand luggage of passengers landing at Dover, together with all luggage either for Dover itself or for destinations other than London, will be examined in the shed in question.

Entrance to the station from the town of Dover is through a building close to the Lord Warden Hotel, giving access to a footbridge along the Admiralty Pier and thence on to the station platforms. The carriage shed, the sides of which are also constructed of reinforced concrete, immediately adjoins the old Admiralty Pier. It forms a structure 770 ft. long by 63 ft. broad, and is intended mainly for the washing and cleaning of carriages, lines leading into it being provided at each end.

It was upon the South Eastern and Chatham Railway that the cost of constructing the station fell, and their outlay on this account amounted to close on £300,000. Allowing for the £400,000 expended by the Dover Harbour Board on the work of reclamation, the total cost thus came to approximately £700,000. Of this important and costly undertaking the Government were able to take full advantage from almost the earliest stage in the war. The station was steadily approaching completion when war was declared, and the fact that it was not then actually ready certainly caused some degree of temporary inconvenience. Dover being the nearest available point to France, the intention was to land there the sick and wounded from that country, and this course was adopted in October, 1914. Disembarkation could, however, then take place only at the Admiralty Pier extension, and the inconveniences of this arrangement were so great that the traffic was transferred to Southampton.

Towards the end of September, however, it was deemed expedient that relief should be given to Southampton by completing the work on the Marine Station at Dover as soon as possible, in order that ambulance traffic could be dealt with there instead of on the extension. An order was given accordingly, and, by a prodigious effort on the part of the engineering staff, the work still to be done on the new station was so far advanced that ambulance traffic was started there on January 2, 1915. Between that date and the end of February, 1919, over 4,000 ambulance boats were received at the berths above-mentioned, and 7,781 ambulance trains, conveying 1,260,000 patients, were despatched to all parts of England, Wales, and Scotland from the Marine Station thus made available. Other war-time traffic dealt with at the new station has included close on 1,775,000 overseas leave and draft men, and 55,400 repatriated British prisoners of war.

The large Customs Examination Shed has since been used for sorting out demobilised men who arrive at Dover in large numbers and, after going through the necessary formalities and being provided with bags of refreshments, are despatched by special trains to their allotted dispersal camps. So vast, so varied, and so exacting an amount of traffic as this would have been an absolute impossibility at Dover under the earlier conditions of the old Admiralty Pier. Nothing, indeed, could have been more fortunate than the practical completion of the station by the beginning of 1915, at least, and the Government, the Army, and the country are alike vastly indebted to the South Eastern and Chatham Railway for the part they took in the timely provision of these new facilities for cross-Channel communication.

Down to January 18 last, when the Dover-Ostend service was resumed, no part of the station had been opened for public traffic, so that, until then, the whole benefit of new works, upon which the railway company had spent so substantial a sum, had been enjoyed by the Government for the purposes of the war.

For information in connection with this article we are indebted to Sir Francis Dent, General Manager, South Eastern and Chatham Railway; Mr. E. C. Cox, C.B.E., Superintendent of the Line; and Mr. P. C. Tempest, C.B.E., Chief Engineer, who was responsible for the design and construction of the new Marine Station.

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The Directorate of Movements and Railways.

RETIREMENT OF SIR SAM FAY, DIRECTOR-GENERAL.

IN view of the exceptionally important part played by railway transport during the war, particularly in the later stages, the Directorate of Movement and Railways has involved responsibilities of an arduous and imperative character. It included road-making, equipment and maintenance as well as the provision, working and upkeep of railways, and of inland waterways and docks, the Director being also a member of the Army Council. Since the cessation of hostilities the situation has necessarily eased so much that it has become practicable for many of the chief officers to return to their civil duties. We have, therefore, to chronicle the retirements of Sir Sam Fay, General Manager, Great Central Railway, from the position of "D.G.M.R."—well-known initials at one time denoting "Director-General of Military Railways," but later "Director-General of Movements and Railways"—and of Sir George McLaren

Photo.] SIR SAM FAY, [*Topical.*

General Manager, Great Central Railway.
Director-General of Movements and Railways,
March, 1918–April, 1919.

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Brown, European Manager, Canadian Pacific Railway, from the office of Assistant Director-General of Movements and Railways.

The post of Director-General of Transportation Services was established in November, 1916, when Sir Eric Geddes became Director-General of Military Railways, in addition to his duties in France, Sir Guy Granet acting as his deputy in London. In January, 1917, Sir Guy took over the position under the title of Director-General of Movements and Railways, and Sir Sam Fay was, at the same time, appointed Director of Movements, subsequently, upon the retirement of Sir Guy Granet, becoming Director-General of the three branches—(1) Movements; (2) Railways and Roads; and (3) Inland Waterways and Docks.

The work of these directorates has included the provision of material and machinery essential to the construction, equipment and maintenance of military railways and roads, and to the capable oversight and direction of the department is largely due the conspicuous military successes achieved as a result of the effective and reliable transport services available in the late stages of the war. Many hundreds of miles of railway were laid down in the various war areas both on the standard and narrow gauge, and thousands of locomotives (large and small, steam, petrol and petrol electric), with tens of thousands of railway wagons of various types, operated thereon. The department also included provision and maintenance of workshops, shunting yards, road-making and repairing equipment, &c., with many other special features all coming under the general term "Movements and Railways."

Technical transport personnel was recruited and trained at Longmoor for the construction and operation of railways and roads, and at Richborough for river canal and dock work. Schools were established for training men in various trades, and a great deal of construction work carried out in the United Kingdom and abroad. Technical officers were supplied for operation in France, Egypt, Mesopotamia, Salonica, Italy, Roumania, the Caucasus, the Caspian Sea, Vladivostok, Murmansk and Archangel.

Train ferries were built for operation between Richborough and Dunkirk and Calais, and also between Southampton and Dieppe and Cherbourg, particularly for the transport of railway rolling-stock heavy guns and motor transport vehicles. Some hundreds of barges and tugs were hired or built for operation between Richborough and the Thames and France, or for use on the canals and rivers in France, on the Nile, the Suez Canal, the Tigris and the Euphrates. Railway track supplied has been upwards of 7,000 miles—3,000 ordinary gauge and 4,000 60-centimetre and metre gauge.

Transport of troops dealt with by the Movements Branch has exceeded 11,000,000 across Channel to and from France, including those to the East over the Cherbourg-Taranto route. In one day as many as 32,000 men were so transported. To the East, and between eastern theatres, the directorate has been responsible for the movement of 5,600,000 officers and men. Horses and mules totalled some 800,000 to all theatres. Tonnage of stores of all kinds exceeded 30,000,000, vehicles on their own wheels numbered 500,000.

A number of the officers and men engaged in the transportation side of the Empire's war effort came from Colonial, South American and Far Eastern railways. The majority of them have been demobilised and have returned, or are returning, to their peace-time occupations. Their services have been invaluable.

Sir Sam Fay was born at Southampton in 1856, educated at Fareham, and joined the Traffic Department of the London and South Western Railway in 1872. In 1884 he became Second Clerk in the Traffic Superintendent's Office at Waterloo, and 10 months later he was appointed Chief Clerk to the Superintendent of the Line, and in 1891 became Assistant Storekeeper. In 1892 he was appointed General Manager of the Midland and South Western Junction Railway, but returned to the London and South Western Railway as Superintendent of the Line in April, 1899. In March, 1902, he became General Manager, Great Central Railway, and was knighted by His Majesty the King when Immingham Docks were opened in July, 1912. Sir Sam Fay is a member of the Railway Executive Committee.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

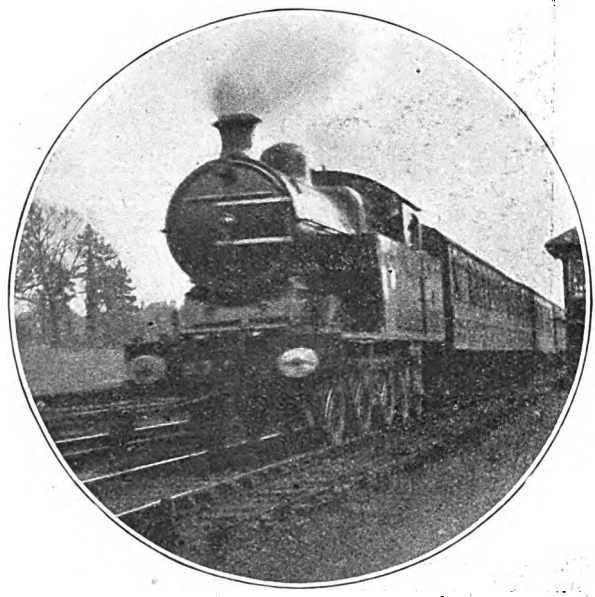

Photo.] METROPOLITAN RAILWAY. [*A. B. MacLeod.*

Down Aylesbury Train approaching Pinner.
0-6-4 tank engine No. 97, "Brill."

COMMENT on train service changes is for the present, or at least until the time-tables have attained some measure of post-war stability, a thankless task, as it would require a running commentary every month in order to keep pace with the praiseworthy amelioration of travelling conditions on most of our great trunk lines. So I will, for a while, postpone any remarks on the subject, and will occupy the first portion of this article in winding up the discussion on possible express train schedules of the future, which has occupied our attention for some months past. It only now remains to outline suggested times for the systems not hitherto mentioned, which I propose to do as briefly as possible, in order to leave a maximum of space in which to deal with performance.

It is clear that, with a nationalised railway system, competition would cease to exist, the best express services being operated by the most suitable route, taking into account distance, grading and general traffic congestion. Such an arrangement would probably eliminate, for example, the London and South Western line as an express route from London to Exeter and the West of England; the Midland between London and Scotland, and also between London and Sheffield, Leeds and Manchester; and the Caledonian between Edinburgh and Glasgow, and Edinburgh and Aberdeen—to name but a few prominent examples. It need hardly be said that fast services would still be required between the various large towns directly connected by the important main lines mentioned, as, for instance, linking up Leicester, Derby, Nottingham, Sheffield, Leeds and Glasgow by the Midland route; but, for practical purposes, it is possible to rule out such cases as regards the proposals at present under discussion, the communication indicated being provided by reasonably fast trains calling at principal stations *en route*.

On the London and South Western Railway, therefore, we are only concerned with the Weymouth main line from London, and to serve Southampton, Bournemouth and Weymouth a 200-ton *luxe* from Waterloo would probably meet all requirements. With one of the large Drummond superheated 4-4-0's of the

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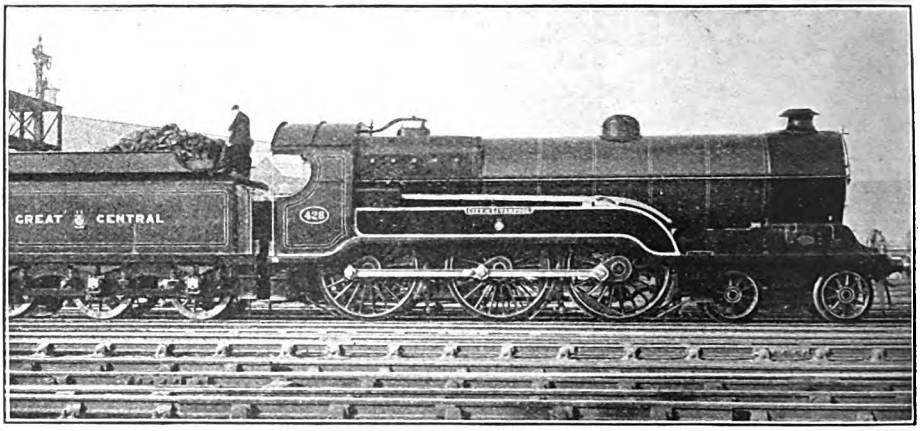

Photo.] GREAT CENTRAL RAILWAY. [*P. F. Cooke.*

4-6-0 engine No. 428, "City of Liverpool" (Sir Sam Fay class) at London Road, Manchester.

463 series we should get through Clapham Junction, 3.9 miles, in 6½ min., and ought to cover the ensuing 8.2 miles to Surbiton in 7½ min., and the 7.9 miles on to the twentieth milepost in 7 min.—total, 21 min. The speed at the latter point would carry us up the subsequent 4.4 miles to Woking in 4½ min., and I have allowed 7 min. for the remaining 6.6 miles of the gentle climb to Sturt Lane (milepost 31). From there the 16.9 undulating miles to Basingstoke should be covered in 15½ min. (total 47.9 miles in 48 min.), and the final 7.8 miles' ascent to Litchfield in 8½ min. Not more than 8½ min. should suffice for the 11 miles from Litchfield down to Winchester, with 5½ min. on to Eastleigh (6.9 miles), and 3½ min. thence to Northam Junction (4.6 miles); slacking as required at the latter point, we should stop at Southampton West (79.3 miles) in 76 min., or, if a non-stop train, pass in ½ min. less. In the latter instance we should require 4 min. further to Totton, 3.3 miles, and another 3 min. up to milepost 85; thence to Brockenhurst, 7.8 miles, I have allowed 7 min., with 2½ min. up the 2.2 miles to milepost 95, 5 min. across the 5-mile "table-land" to milepost 100, 3½ min. for the 4.3 miles down to Christchurch, and 4½ min. for the final 3.7 miles into Bournemouth Central. These allowances will be found to total 105 min. for the 108 miles from London, and this time would require to be increased by about 5 min. if a 3-min. stop were included at Southampton. With a reduced load the remaining 34.8 miles to Weymouth might be covered in 38 min, which would give a time of 145 min. for the 142.8 miles from Waterloo, including a 2 min. stop at Bournemouth, or 2½ hours if the Southampton stop be also incorporated.

On the London, Brighton and South Coast and South Eastern and Chatham Railways the journeys are too short to admit of any really substantial reduction of pre-war times. Even with 200 tons only, it would need very hard going, as a regular thing, to cover the 51 miles between Victoria and Brighton in 50 min., and with the slacks at Keymer, Lewes and Polegate it would be practically impossible to cut the time to Eastbourne, 65.8 miles, below 70 min., these being only accelerations of 10 and 15 min. respectively on the best pre-war standards. The difficulties of the South Eastern section of the South Eastern and Chatham Railway are generally a little over-rated, and there should be no difficulty, if Cannon Street were made the starting point, in passing New Cross, 3.7 miles, in 6 min.; covering the 11.6 miles from there up to Knockholt in 14 min.; the 13 miles from there down to Tonbridge in 11 min., inclusive of the customary slack over the junction; the 26.6 undulating miles from Tonbridge to Ashford in 24½ min.; and the final 13.9 miles to Folkestone Central in 14½ min.—total, 70 min. from London for 68.8 miles. The possible time would

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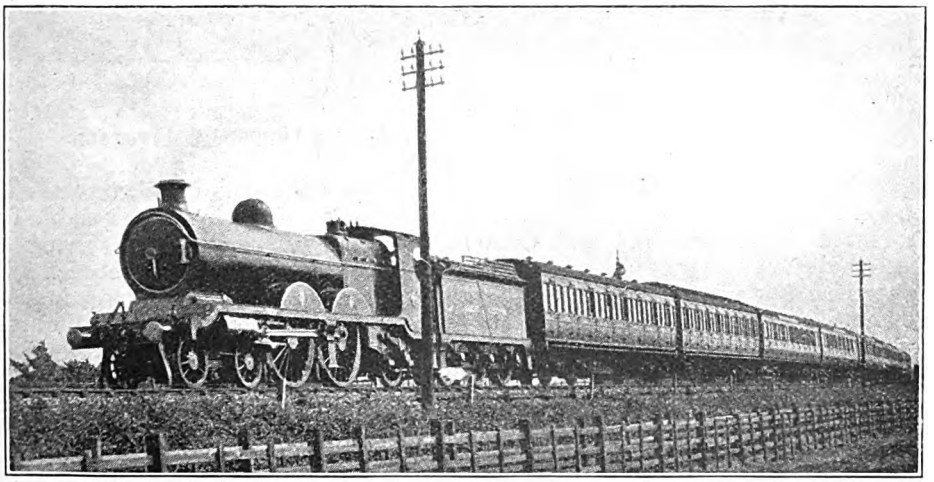
really be a shade under this, and when the direct line between Folkestone and Dover is reopened, a 75-min. run for the 75.3 miles from Cannon Street to Dover Town should be practicable to one of the large superheater 4–4–0's, hauling 200 tons. On the other hand, the fearsome gradients and severe service slacks of the Chatham section would permit of but little substantial acceleration of the present really tight 90-min. allowance over the 74.5 miles between Victoria and Margate. Indeed, I doubt whether an 80-min. timing would be feasible, even with a 200-ton load only, unless engines of considerably enhanced power were employed.

Two-hundred-ton loads are somewhat rare on the express train services of the Great Eastern Railway, and were so also in pre-war times, so that substantial curtailments of time should be possible if the six-coupled engines were employed on light trains of this character. On the Colchester main line we could get through Stratford, 4 miles, in 7 min., despite the initial hindrance of Bethnal Green Bank, and, recovering from Stratford slack, should breast Chadwell Heath, 10 miles, in 14 min., and complete the 20.2 miles to Shenfield, including the ascent of Brentwood Bank, in 26 min. Going "all out" on the succeeding easy length to Colchester, we should cover the 9.5 miles from Shenfield to Chelmsford in 8½ min., the 8.9 miles thence to Witham in 8½ min., and the 13.1 miles on to Colchester in 12 min.—total, 51.7 miles in 55 min. from the start. Colchester to Manningtree, 7.8 miles, would occupy 8½ min., and Manningtree to Ipswich, 9.2 miles, 9½ min. —total, 73 min. for 68.7 miles. These times allow of moderate slacks through Chelmsford and Colchester, and a more pronounced one at Ipswich. Recovering from the latter, we require 12½ min. for the faintly ascending 11.9 miles to Stowmarket, and 6 min. for the ensuing 4.9 miles' ascent to milepost 85½, after which the falling 11 miles to milepost 96½ should be negotiated in 9 min. Rushing the short bank between mileposts 96½ and 99, we should get through Tivetshall, 100.5 miles, in 105 min., and 10½ min. should then suffice for the 12.3 downhill miles on to Trowse Upper Junction. For slacking here and over the swingbridge into Norwich (Thorpe) I have allowed 4½ min. (distance 2.2 miles), making up a total of exactly 2 hours for the 115 miles from Liverpool Street. A non-stop express from London to Cromer on the same basis could complete the 138 miles in 2½ hours, even including the final 7 miles of single line, but barely in less, as the many severe slacks and heavy gradients beyond Trowse Upper Junction are altogether subversive of high speed. On the Cambridge line I am inclined to think that the University



[*Photo.*] GREAT CENTRAL RAILWAY. [*W. Bradshaw.*

London-Manchester express passing Abbey Lane Sidings, Leicester, 4-4-2 locomotive, No. 264.

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town could be reached in the even hour, if Tottenham, 6 miles, were passed in 10½ min.—by no means as easy an achievement, with due observance of service slacks, as might appear on paper—the 11.1 level miles to Broxbourne being then covered in 10 min., and the 13.3 slightly ascending miles to Bishop's Stortford in 13½ min. Recovering from Stortford service slack, we should climb the 5.2 miles to Elsenham in 7 min., utilising 5½ min. on the ensuing 6.1 miles' descent to Audley End, and 13½ min. for the final 14 miles' drop from Audley End to Cambridge. These times, again, contemplate a 200-ton load.

In regard to the Midland and Great Central routes, it is exceedingly difficult to lay down any times. Even 200 tons represents something in excess of the average load of the crack Great Central pre-war expresses, and at the very best, with such a load as this, it would be difficult, if not impossible, to cut the Sheffield non-stop time from London below 165 min., or below a similar figure on the Midland route either, which the Great Northern could beat by 5 min. without such proportionately hard work, as already shown. Similarly to Manchester the London and North Western route would have the advantage over both the Midland and the Great Central, and to Leeds and Bradford the Great Northern again has all the advantages. So far as London is concerned, therefore, we have only Leicester, Nottingham and Derby left in these cases, the minimum practical time to which I should put by the Midland route, with 200 tons, at 97, 120 and 125 min. non-stop. The Great Central would need several minutes more to both Leicester and Nottingham.

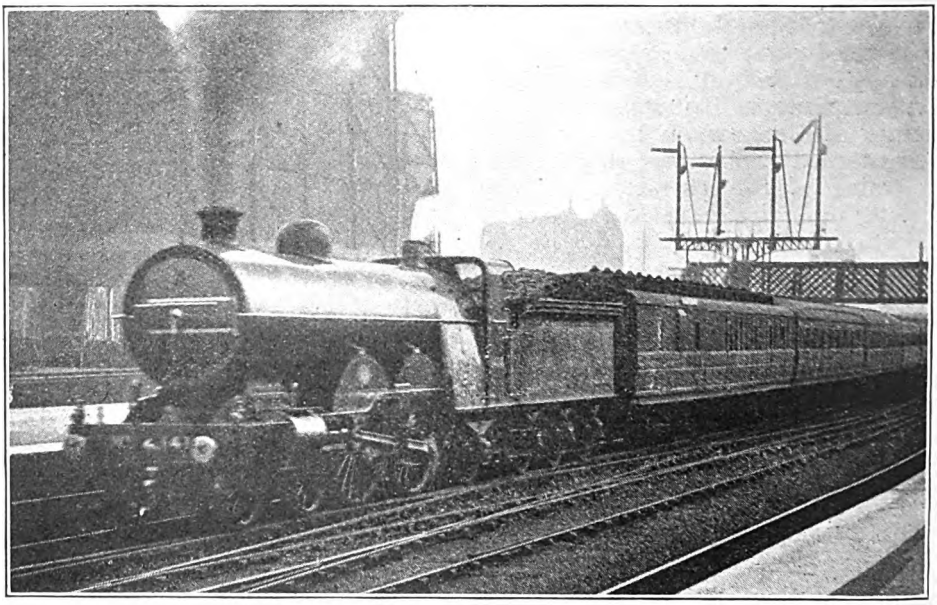

Photo.] GREAT NORTHERN RAILWAY. [*B. W. Groom.*

Down Scotch express ascending Holloway bank. 4-4-2 locomotive, No. 1414.

As regards routes in other parts of the country little further need be said. There is, and always has been a crying need for faster communication between Liverpool, Manchester, and the large industrial centres of the West Riding of Yorkshire; and it ought to be possible to bring Leeds, in particular, within 1½ hours of Liverpool by the London and North Western route, in the proportion of 32 minutes for the 31½ miles from Lime Street to Exchange, with 55 minutes left for the difficult 43 miles thence to Leeds, after a 3 min. halt at Manchester. Liverpool to Bradford in the same time, by the Lanca-

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shire and Yorkshire route, would be a tougher proposition, but there would be nothing to prevent a combined 6-coach Leeds and Bradford express being run from Lime Street at Liverpool to Exchange at Manchester in, say, 34 min., the 3-coach London and North Western Leeds portion leaving 3 min. later, with a 53-min. schedule to Leeds, and the Bradford portion 6 min. later, running over the Lancashire and Yorkshire route to Exchange, 41 miles, in 50 min. In fact, with such light loads, not exceeding 100 tons, it should be possible to include stops at Huddersfield in the former case, and Halifax in the latter, without increase of total journey time. Further north, I see no reason why Edinburgh should not be brought within 45 min. of Glasgow by the North British route, with a load not exceeding 200 tons. The line concerned is 47¼ miles in length, but almost perfectly flat, with the sole exception of Cowlairs Bank, out of Queen Street, Glasgow, and this difficulty would be overcome by banking in the east-bound direction. Certainly 50 min. would be a more than ample allowance.

In concluding this discussion, I may say that, in my opinion, there is little probability of any such times as those outlined ever coming into operation with steam locomotives. The rapid development and increasing reliability of aerial travel clearly indicate that the fastest traffic of the immediate future will go by way of the air. By the time that the railways have repaired the ravages of war we shall probably be well on the road to the electrification of main lines foreshadowed by the Minister-designate of Ways and Communications, and any future developments in railway speed are thus likely to be electrical rather than mechanical. At the same time, one cannot but express regret that the progress in speed that was being made in the early part of the present century was not further developed. There is little doubt that the institution of very rapid expresses of the nature and speed indicated in the past few articles of this series, if the companies concerned had made an adequate charge for their use, would have been found a paying proposition.

I must apologise for so soon directing attention again to the performance of the Great Northern Railway, but I have had two such uncommonly interesting runs—and interest is distinctly uncommon in most of the locomotive running of to-day—that I want to lose no time in giving them publicity. In brief, on two recent consecutive runs, on the 1.40 p.m. and 5.30 p.m., *ex*-King's Cross, both non-stop to Grantham, we were engined by one of the large boilered "Moguls." In the former instance the engine was No. 1645, and the load 15 coaches or 62 axles—443 tons empty, and not less than 490 tons full, as passengers were standing in the corridors; in the latter, it was No. 1648, with a 13-coach train of 54 axles, 369 tons tare and 400 tons full. By way of comparison I am going to take two other recent journeys on the 5.30 p.m. down—both exceptionally fine in character, behind superheater "Atlantics," hauling almost exactly the same loads. No. 294 had a 56-axle train of 365 tons empty and 395 tons full, while No. 1431 had a tremendous 66-axle load of 448 tons tare and, as nearly as I could estimate, 495 tons gross. Thus the conditions were almost identical, except in so far as No. 1431 had to be piloted to Potter's Bar by 4-4-0 No. 1346. We will call the two lighter trains M1 and A1, according as the trains were "Mogul" or "Atlantic" hauled, and the heavier trains M2 and A2 for brevity in reference.

No. 1648 did rather poorly throughout the journey, and her (M1) time of 8 min. to Finsbury Park does not compare with the M2 time of 8¼ min., with nearly 500 tons; A1 took 8 min. 5 sec., and A2 (piloted) 6 min. 40 sec. Up to Potter's Bar (12·7 miles) the times were:—M1 and M2, 25 min. 35 and 40 sec., with minima in both cases of 32 m.ph.; and A1 and A2 24 min. 25 sec., with a minimum of 35 m.p.h., and 21 min. 35 sec. to the stop, which lasted 110 sec. We were through Hatfield (17·7 miles) in 31 min. 45 and 50 sec. ("Moguls"), and 30 min. 10 sec. and 31 min. 30 sec. ("Atlantics"). I thought it distinctly to the credit of No. 1645 that, unpiloted, she got through Hatfield within 20 sec. of the piloted time of No. 1431, with an identical load; but one would expect the 6-coupled engine, with her 5 ft. 6 in. wheels, to have the advantage over this length. Once we got on to the fast-running stretches of line, however, the "Moguls," with their smaller boilers and fire-boxes, appeared soon to get "winded."

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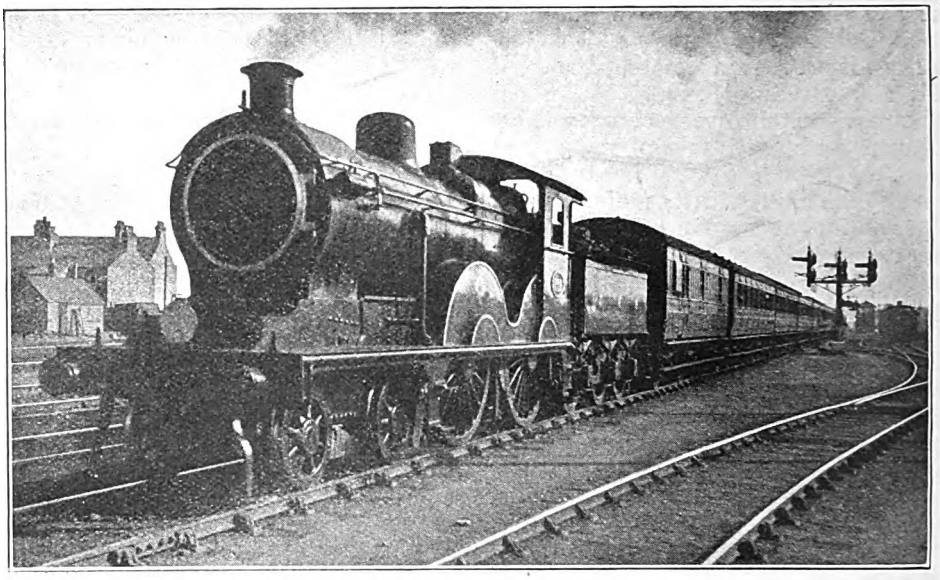

Photo.] GREAT EASTERN RAILWAY. [*W. H. C. Kelland.*

Down train leaving Cambridge. 4-4-0 rebuilt superheater engine, No. 718.

For example, taking the corresponding loads together, M1 with A1 and M2 with A2, our maxima beyond Hatfield were 64 and 66, 59 and 61 m.p.h.; minima at Woolmer Green, 40 and 47, 39 and 42 m.p.h.; and highest rates on the long descent from Stevenage 67 (a good speed this, with 5 ft. 6 in. wheels) and 74, 60 and 75 m.p.h., in the last instance well sustained. Hatfield to Knebworth, 7·3 miles, took 9 min. 5 sec. and 8 min. 10 sec., 9 min. 25 sec. and 8 min. 55 sec.; Knebworth to Hitchin (6·9 miles) 7 min. 40 sec. and 6 min. 55 sec.; 8 min. 20 sec. and 7 min. 5 sec.; and Hitchin to Sandy (12·2 miles) 12 min. 10 sec. and 11 min. 50 sec., 13¼ min. and 10 min. 50 sec. It should be mentioned that the second and third of the last-mentioned times include in each instance slight signal checks at Arlesey, costing about a minute. Sandy to Huntingdon (14·8 miles) occupied 17 min. 40 sec. (here No. 1648 was distinctly short of breath) and 15 min. 25 sec., 16¼ min. (one of No. 1645's best pieces of work, with a speed of all but 60 m.p.h. sustained on the level) and 14½ min. Huntingdon to Ripton (4·6 miles) took 7 min. 10 sec. and 5¾ min., 7 min. 25 sec., and 5 min. 35 sec., the minima on Stukeley bank being 33 and 42, 32 and 45 m.p.h. respectively, and Ripton to Yaxley (9·1 miles) 9 min. 55 sec. and 8 min. 40 sec., 10¾ min. and 8 min. 35 sec., with maxima on Woodwalton bank of 61 and 69, 55 and 71½ m.p.h. The 3·8 miles from Yaxley into Peterborough took 5 min. 10 sec. and 4 min. 25 sec., 6 min. 5 sec. and 12 min. 10 sec., as No. 1431 was stopped by signal at Fletton Junction, and hopelessly checked all the way thence to Essendine, the remainder of that journey being ruined. It was positively amusing to notice the exemplary caution of the "Mogul" drivers in approaching Peterborough, evidently arising out of habits of mind contracted in the operation of goods trains; No. 1645's driver, indeed, brought us down to so funereal a pace over the Great Eastern Railway bridge that he had to put steam on again vigorously in order to get through the platforms.

Our actual times from London to passing Peterborough (76·4 miles) were thus 100 min. 35 sec. and 91 min. 20 sec., 103 min. 20 sec. and 99 min. 10 sec., but the net times were 100½ and 90 min. with the lighter trains, and 102 and 91¼ min. with the heavier. No. 1431, driven by Ledger, of Grantham shed, had performed some work of outstanding merit with her huge train, the times of 8 min. 5 sec. from

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Potter's Bar start to Hatfield, 5 miles; 24 min. 5 sec. to Hitchin, 19·2 miles; 34 min. 55 sec. to Sandy, 31·4 miles; 49 min. 25 sec. to Huntingdon, 46·2 miles; and 63 min. 35 sec. to Yaxley, 59·9 miles, being really superlative with a load of all but 500 tons. Out of Peterborough we passed Essendine (12·2 miles) in 18 min. 50 sec. and 15 min. 25 sec., with 18 min. 5 sec. on run M2; Essendine to Stoke Summit (11·5 miles) took 19¾ min., 16 min. 35 sec., and 19½ min. (falling to minima of 30, 33 and 29½ m.p.h.); and Stoke Summit down to Grantham (5.4 miles) 7 min. 5 sec. (slightly checked by signal), 6 min. 55 sec. and 7 min. 40 sec., with more most cautious work on the part of No. 1645. No. 1648 had this run to Grantham (105·5 miles) with 390 tons in 146 min. 15 sec., or 145½ min. net—a loss of 12½ min. on schedule; No. 294 had completed the journey in 130¼ min., or 129 min. net, thereby gaining 4 min.; while No. 1645, by occupying 148 min. 35 sec. on the run had almost exactly maintained the schedule time of the 1.40 p.m. (148 min.) on which the latter run was made. Net time in the last-mentioned instance was 147¼ min., and with more reasonably fast running into Peterborough and Grantham we could easily have cut 3 or 4 min. off this figure. I have little doubt that No. 1431, despite her tremendous load, would unchecked have kept the 133 min. schedule of the 5.30 p.m. to Grantham. It will be seen that there is a family likeness about the work of the "Moguls." No. 1645 did excellently throughout, in consideration of her 495-tons train and limited steaming capacity; and No. 1648 would probably have done better had she not been brought on at the last moment in substitution for a defective "Atlantic." Taking the best point-to-point times out of the two 2-6-0 runs we get figures of 47 min. 55 sec. to Hitchin, 76 min. 10 sec. to Huntingdon, 98¼ min. to Peterborough, and 142 min. 50 sec. to Grantham, which are not at all discreditable. No. 1645's starting-time to Finsbury Park was superior to anything I have recorded, unpiloted, with a load exceeding 450 tons.

I must resist the temptation of describing any of the continuation journeys from Grantham, except that of the last 5.30 p.m. trip, when we were taken forward by No. 1453, superheater 4-4-2, the load being still 495 tons. We passed Newark (14·6 miles) in 17 min. 50 sec., ran the

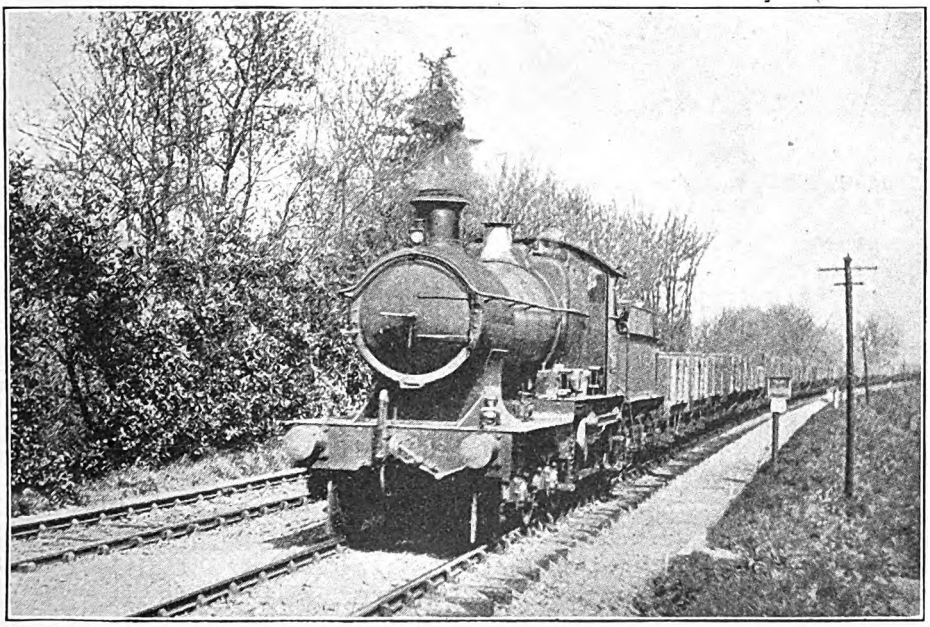

Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*P. S. A. Berridge.*

Great Western Railway 4-4-0 engine No. 3426, on goods train near Betchworth.

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12·6 miles up to Markham in 16 min. 10 sec., and got through to Retford (33·1 miles) in 39½ min. (easing pronouncedly over the level crossing), and Doncaster (50·5 miles) in 59½ min. The 18·4 miles from Doncaster to Selby occupied 22 min. 20 sec., and although we slowed through the latter station to the unnecessarily cautious figure of 22 m.p.h., we nevertheless completed the final, and mainly adverse, 13·8 miles into York in the uncommonly good time of 18 min. 20 sec. This made a total of 100 min. 10 sec. from Grantham (82·7 miles), but with higher speeds at Retford and Selby I do not doubt that we should have got through in 98 or even 97 min., *i.e.*, the pre-war running times of the 10 a.m. and 2.20 p.m. trains out of King's Cross. Onwards from York, with another coach added, bringing the load to 70 axles, or 530 tons full, a 3-cylinder 4-4-2 of class Z took all but 42 min. to Northallerton, and 21½ min. thence to Darlington, losing, with 2 min. overtime at Northallerton, a total of 15½ min. on this stretch alone. Next night the same train was made up to 19 vehicles of corridor stock, 539 tons empty and 590 to 600 tons full, and lost 19 min. over the same tretch, with an engine of the same type. The very best I have done recently, with 2172, class Z, and 64 axles, or 460 tons, was to pass Alne (11.2 miles) in 15 min. 20 sec., at 61 m.p.h.; Pilmoor (16·1 miles) in 20 min. 25 sec.; and Thirsk (22·2 miles) in 26 min. 35 sec., at 64 m.p.h. In this instance Northallerton (30 miles) was reached in 35 min., and the remaining 14·1 miles to Darlington were run in the really brilliant time of 17 min. 50 sec., No. 2172 maintaining 58½ m.p.h. up the 1 in 696 to Eryholme, and then touching 68 m.p.h. at Croft. Even so, 2¾ min. were lost on schedule. In such circumstances, what can be the object in retaining in time-table after time-table such counsels of perfection as 32 min. from York to Northallerton, 18 min. thence to Darlington, and 26 min. for the 22 miles, mainly adverse, from there to Durham? This important express is due in Newcastle—on paper—at 11.25 p.m., but I should imagine that it somewhat rarely makes the acquaintance of Tyneside on the same day that it left King's Cross. By the way, while referring to No. 2172, I may say that this engine is credited with having worked a train of 23 bogie vehicles, weighing 638 tons empty and over 700 tons full, from Darlington to York, on the 11.10 a.m. train, in the scheduled time of 59 min. This feat, made with the heaviest passenger load I have seen on record in this country, is well authenticated.

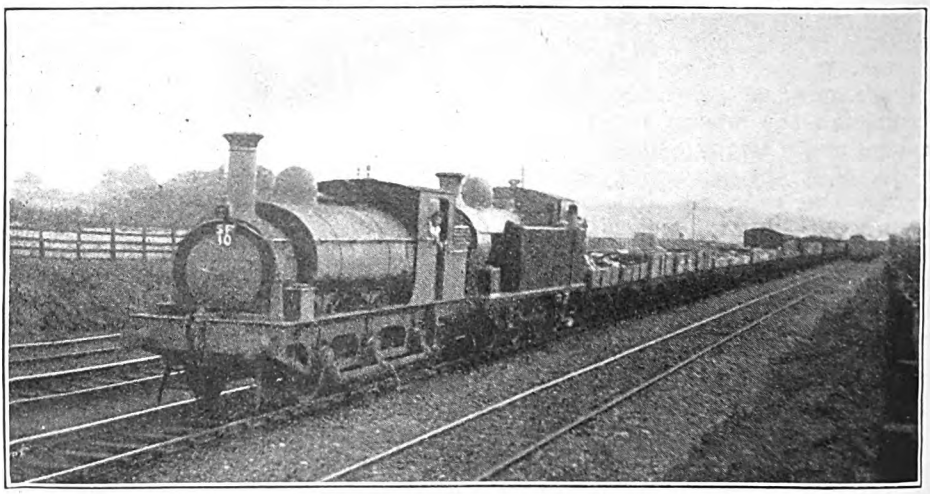

Photo.] RHYMNEY RAILWAY. [*K. A. C. R. Nunn.*

Cardiff-Caerphilly special mineral train, engines Nos. 7 and 118, banked in rear by No. 88.

But now let me pass on to the Great Central Railway. As comparisons bulk largely in this article, it will not be amiss

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to compare the performance of an "Atlantic" and a 4-6-0 of the "Sir Sam Fay" type on the 8.45 a.m. from Marylebone to Manchester. The former emanates from a correspondent, whereas the latter is my own timing. No. 365, *Sir William Pollitt*, a 3-cylinder compound, was the engine in one case, and No. 428, *City of Liverpool*, that in the other, with featherweight loads of 6 and 5 60-ft. 8-wheelers respectively, totalling with passengers 210 and 180 tons. The 4-6-0 reached Harrow (where my friend joined his train), 9·2 miles, in 14 min. 35 sec., despite a signal check, or 13½ min. net. From Harrow the "Atlantic" ran to Northwood (4 miles) in 6 min. 35 sec., and the 4-6-0 in 6 min. 50 sec. Restarting, the trains passed Rickmansworth (3·5 miles) at reduced speed, in 5 min. 9 and 10 sec., covered the 6·4 miles' ascent at 1 in 105 thence to Amersham in 10 min. 25 and 20 sec., both maintaining 36½ m.p.h. on the climb; ran from Amersham to Wendover (9.7 miles) in 10 min. 26 and 10 sec.; and from Wendover into Aylesbury (4·7 miles) in 4 min. 58 sec. and 5 min. 5 sec.; making a total of 30 min. 45 and 56 sec. for the difficult 24·3 miles from Northwood. From Aylesbury the times to Quainton Road Junction (6·4 miles) were 8 min. 23 and 50 sec., and to the stop at Finmere (16·5 miles) 19 min. 36 sec. and 20 min. 10 sec., the 4-4-2 driver making the harder running, as on this occasion the train left Aylesbury behind time. Finmere to Brackley (4·8 miles) took 7 min. 38 and 10 sec., the 4-6-0 here having considerably the best of it. From Brackley, again. the 4-4-2's time of 5 min. 55 sec. up to Helmdon, 3·2 miles mostly ascending at 1 in 176, was 15 sec. longer than the 4-6-0's 5 min. 40 sec.; and Woodford (9·8 miles) was reached in 13 min. 11 sec. and 12 min. 40 sec. Once again from Woodford the 4-4-2 made an inferior start to Charwelton, the 2.4 miles taking 4 min. 49 sec. against 4½ min. of the 4-6-0; but the former, again making up time, ran much harder to Rugby, the 14·1 miles from Woodford, start to stop, occupying 15 min. 33 sec. and 16 min. 25 sec. From Rugby to Lutterworth (6·8 miles) took 9 min. 25 sec. start-to-stop, in the case of the 4-6-0 run, but the 4-4-2 run was made prior to the insertion of this stop in the schedule, and the passing time was 8 min. 33 sec., Leicester, 19·9 miles from Rugby, being reached in the very smart time of 19 min. 58 sec.—*i.e.*, in practically "even time." The 4-6-0, running under the easiest steam, completed the 13·1 miles from Lutterworth in 15 min. 10 sec.

Better running would doubtless have been made by the 4-6-0 engine had it not been that we were so well on time throughout the journey; in fact, we left Lutterworth nearly 2 min. in advance of time, so far as Marylebone clock was concerned. Beyond this, allowing for the disparity in the loads, there was little to choose between the performances of the two engines, except that the 4-4-2 was driven much the faster down hill, attaining 76½ m.p.h. on Catesby Bank, against the 4-6-0's 71½; while on Ashby Bank No. 428's modest maximum of 69 was beaten by the 4-4-2's sustained 82 for two consecutive miles. In fact, in the latter case, the time between mile-posts 110 and 104 (6 miles) was only 4 min. 32 sec.—an average of all but 80 m.p.h. throughout. At Leicester my friend alighted, but I continued to Manchester with the same engine and load. We ran from Leicester to Loughborough (9·8 miles) in 12 min. 55 sec., and from Loughborough to Nottingham (13·6 miles) in 17 min. 20 sec. From Nottingham we climbed to Kirkby South Junction (10·8 miles) in 17 min. 20 sec., passed Heath (20·3 miles) in 28 min., and reached Sheffield (38·2 miles) in 49 min. 25 sec. Between Sheffield and Penistone we were stopped dead by signal, but from the start on a 1 in 100 grade at the latter station we made a really magnificent ascent to Dunford Bridge, attaining 46½ m.p.h. on 7 miles' ascent at 1 in 130-124-135 to the latter station, which was actually passed in 9 min. 50 sec. Touching 66 m.p.h. beyond Crowden, we reached the conditional stop at Dinting (16·5 miles) in 21 min. 25 sec. Dinting to Guide Bridge (6·9 miles) took 10 min. exactly, and Guide Bridge to Manchester (Central), (11·1 miles) 15¾ min. In all, I estimate that 10¾ min. stood to the credit of the engine at the end of this run by gains on schedule time.

I will conclude with a down journey on the popular 3.15 p.m. from Marylebone recently, that had some remarkable features. Out of London the engine was a "Director" 4-4-0, No. 429, *Sir Douglas*

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Sheffield No. 1092 was replaced by No. 261, of the same type, No. 1088 continuing to pilot the train. On the ascent from Sheffield to Penistone, entirely at 1 in 120 to 132, we worked up to 45 m.p.h., completing this 12·9 miles in 20¾ min., against an allowance of 24 min. From here Dunford Bridge was passed in 10 min. 35 sec., at 42 m.p.h., and Dinting in 21½ min., Guide Bridge (23·4 miles) being reached in 30 min. 20 sec. In this case 40 min. are allowed. Finally, from Guide Bridge No. 261, unpiloted, ran us into Manchester (Central) in 16½ min., gaining yet ½ min. more on schedule time. Summing up all these gains, which only served to occasion inordinate waits for "time" at almost every stopping place, we have an aggregate of just over 14 min. from Leicester! Events seem to conspire in providing me with evidence in refutation of Lord Monkswell's claim that time is not made up in Great Britain!

By the way, the answers to querists which appear frequently in the "Why and Wherefore" columns make it appear that the Editor is bombarded frequently with questions as to the doings of the one and only *Great Bear* of the Great Western Railway. I saw No. 111 recently working the express due in Paddington at 12.40 p.m., and almost immediately afterwards received a letter from a correspondent which indicates that at the time of writing this forms a regular "turn" in the case of the engine in question. My friend had made a journey on the train mentioned, of which he sends me some rather scanty particulars. Out of Bristol *The Great Bear* had a modest load of 8 bogie vehicles, mostly of the 70-ft. stock, and ran to Bath (11.4 miles) in 17½ min., 18 min. being allowed. Bath to Chippenham, 12·9 miles, including 2 miles up at 1 in 100 through the Box Tunnel, took 18 min., instead of the 20 min. scheduled. Chippenham to Swindon (16·7 miles) occupied 21¾ min., the allowance being here 24 min. At Swindon the load was made up to 12 bogies, and the 4-6-2 engine passed Didcot (24·2 miles) in 26 min., but was delayed by signal before Reading; even then the 41·3 miles were run in 49¼ min., against a booking of 54 min. The only schedule time exceeded was that of 42 min. for the 36 miles from Reading to Paddington, which required 43¼ min., but a bad p.w.r. check to 10 m.p.h. was experienced at Twyford. Obviously the big locomotive had a great deal more time on her hands—or should I say her wheels—than she knew what to do with on such slack bookings, for all the minutes lost at stations to Reading were more than made up with the greatest of ease.

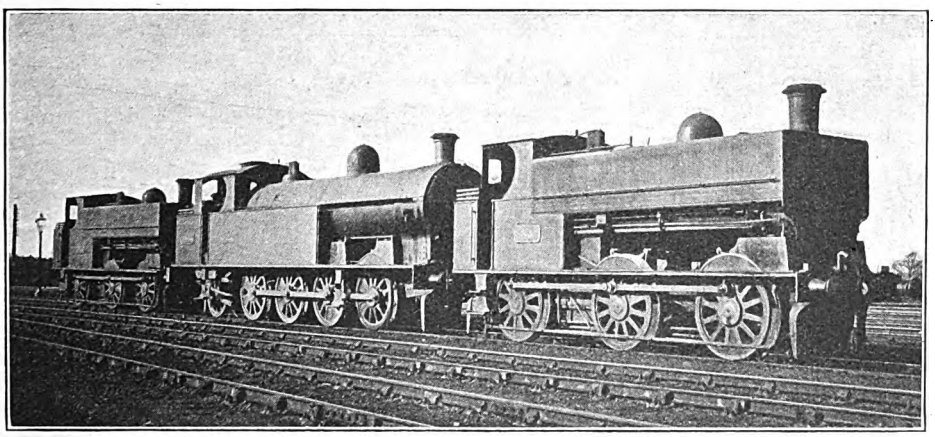

Photo.] LONDON & NORTH WESTERN RAILWAY. [*W. H. Whitworth.*

Shunting tank-engines at Speke Junction. Nos. 85 (0-6-0), 1663 (0-8-2) and 2079 (0-6-0).

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Photo.] NORTH BRITISH RAILWAY. [*F. Bell.*

Edinburgh–Hyndland Train near Forrestfield. 4-4-0 Locomotive No. 734.

Some Curious Scottish Train Services.

By C. C. LITTLEJOHN.

IT would probably be hard to find a stranger railway anomaly than that of a mineral line, over which the owning company runs no passenger trains whatever, forming part of a rival Company's main line, and over which the latter exercises running powers for all descriptions of trains from the "Postal, Limited," downwards. This curious state of affairs exists a mile or two north of Coatbridge, where a North British mineral line from Sunnyside Junction to Garngaber Junction is made use of, for a distance of 52 chains between Gartsherrie Junction and Garnqueen South Junction, by all Caledonian trains to and from the north. It thus forms part of the "West Coast Route" to Aberdeen, and is traversed by a number of through Caledonian expresses daily, as well as by "locals" from Coatbridge to Glenboig and back; but no North British passenger trains of any kind use it.

Strangely enough, the position of the two companies is reversed not many miles further north, as two short sections of the Caledonian Railway may be found which are now used by passenger trains of the North British Railway. The first instance is the line, 60 chains in length, which connects the Caledonian Railway main line at Greenhill with the adjacent Edinburgh-Glasgow main line of the North British Railway. Until the end of 1869, Caledonian trains between Glasgow and the north ran over the North British Railway from and to Glasgow (Queen Street) *via* Greenhill, but the connecting line here is now used exclusively by North British running power trains from Glasgow (Queen Street) to Larbert, Alloa, and Stirling, and to Grangemouth direct *via* Falkirk (Camelon), and *vice versa*. The last-mentioned service comprises three trains daily each way at the present time, and these traverse the other short section of Caledonian "metals" no longer used for passenger traffic by the owners. This is the spur, 38 chains in length, between Carmuirs West and East Junctions. In normal times, one Caledonian passenger train ran daily from Greenhill to Grangemouth with through carriages from Glasgow (Buchanan Street) and *vice versa*, but these were discontinued when the restricted war services came into force, and connections between

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Buchanan Street and Grangemouth are now made *via* Larbert. It may be mentioned here that neither Caledonian nor North British trains from Glasgow to Grangemouth can complete their journey without exercising running powers over the other's lines; this also applies to passenger trains of either company between Larbert and Alloa.

A curious journey of about a dozen miles from start to finish, which necessitates the engine "rounding" its train at two different points *en route*, although in neither instance at a station, may be found in the current Caledonian time-tables. Daily, except Saturdays, a workmen's train leaves Lanark at 5.30 a.m. for the out-of-the-way passenger terminus at Coalburn, and a glance at a railway map of the district reveals the fact that the journey is a distinctly awkward one. The first "reversal" takes place at Poniel Junction, between Douglas and Douglas (West) stations, where the Muirkirk section is left, and the train proceeds northwards to Alton Heights signal-box, 2 miles 34 chains from Poniel. This is the junction of the old and new Lesmahagow lines with the Coalburn branch, and the second "reversal" is rendered necessary here, Coalburn being ultimately reached at 6.23 a.m. A corresponding return train leaves Coalburn at 3.15 p.m. for Lanark, and is combined at Alton Heights with a portion which leaves Brocketsbrae at 3.20 p.m. The county town is reached at 4.14 p.m., after twice reversing, as on the outward journey. Passengers who desire to proceed beyond Lanark require to change trains, and as the station is a terminus, it is left in the same direction as it is entered from. In order to reach Wishaw, or any other station in the north, yet another "reversal" becomes necessary at Carstairs—the fourth since leaving Coalburn, and sufficient, surely, to confuse even the most level-headed traveller as to the direction in which he is ultimately proceeding! In addition to these workmen's trains between Lanark and Coalburn, an ordinary passenger train leaves Brocketsbrae at 9.7 a.m. (8.28 a.m. ex Hamilton Central) for Lanark, returning from the county town at 11.30 a.m., but on both journeys it proceeds westwards from Poniel Junction to Douglas (West), at which station the engine "rounds" its train. On Saturdays, however, an extra train leaves Brocketsbrae at 2.37 p.m. for Lanark, which "reverses" at Poniel Junction.

While on the subject of journeys entailing "reversals," mention may be made of another example to be found on the Caledonian Railway at present. This is the 5.40 p.m. train from Bankfoot to Perth, *via* Stanley, the engine of which "rounds" its train twice on the short journey, but in each case at a station. The Bankfoot Light Railway is 3 miles in length, and was for some time worked as an independent company, and a separate platform for the branch trains is provided at Strathord to the west of the Caledonian station proper. Physical connection is effected between the two systems by a junction between the light railway and one of the goods sidings whence trailing points lead to the down main line, and it is not possible for trains to run through from Perth to Bankfoot and *vice versa* without shunting into the siding first. In the case of the 5.40 p.m. from Bankfoot, the engine requires to "round" its train in addition, since the train in question makes an extra trip to Stanley Junction and back, and the method of working in this case may be briefly described. On arriving at the light railway platform at Strathord at 5.51 p.m., the engine "rounds" its train by means of the loop provided for this purpose, and thereafter draws the carriages in the direction of Bankfoot until they are clear of the points leading to the goods siding referred to. The train is then propelled into the latter, whence it draws forward on to the main line and again shunts back alongside the down platform of the Caledonian station. Seven minutes are allowed for the shunting operations, and at 5.58 p.m. it leaves for Stanley, 2 miles 6 chains north of Strathord. Passengers for Perth get this "extra" without any additional payment, as the train does not call at Strathord on its return from Stanley. On arriving at Stanley at 6.3 p.m. the train runs through the down line and shunts over to the up platform; the engine thereafter proceeds to "round" it again, and finally departs for Perth at 6.15 p.m., arriving at its destination at 6.32 p.m.

Two "reversals" are also rendered neces-

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sary on the North British Railway in the case of the 2.40 p.m. train from Fort Augustus to Corpach, the engine of which requires to "round" its train at Spean Bridge and Fort William respectively.

The North British Railway could also show a journey of a roundabout nature in its recent time-tables which, although hardly so curious as the Lanark-Coalburn service of the Caledonian already described, was interesting since the train in question traversed in the course of its short journey three different sections of line not otherwise used for ordinary passenger traffic, and in addition called at a semi-derelict station *en route*. Daily, except Saturdays, a train left Dunfermline (Upper) at 5.53 p.m. for Cardenden, which, instead of following the orthodox route by way of Cowdenbeath (New) (on the Edinburgh-Perth main line) ran by the old line from Cowdenbeath South Junction *via* Cowdenbeath (Old), and was the only passenger train available to the public which called at that station. Even then it did not proceed direct to its destination, but undertook another deviation northwards over a mineral line from Lumphinnans Central Junction to Kelty, rejoining the Perth main line at Kelty South Junction. The train was due to arrive at Kelty at 6.24 p.m., and after "reversing," departed at 6.35, running thence to Lochgelly direct by means of the spur between Lumphinnans North and East Junctions. The journey in all occupied 58 minutes instead of the customary half-hour for the distance of 10 miles by the direct route *via* Cowdenbeath (New). As the train was primarily run for the conveyance of workers, only third-class accommodation was provided, but it was discontinued as from March 31 last, and Cowdenbeath (Old) has disappeared from the time-tables in consequence.

Another "roundabout" service of the North British Railway is that given on Saturdays by the 12.7 p.m. train from Balloch, which runs to Milngavie *via* Queen Street (Low Level) and Springburn. After a wait of 7 minutes it leaves Queen Street at 1.14 p.m. and runs back non-stop to Westerton, at which station it has already called on its journey from Balloch, and thus gives a complete circle service from that station. Although it passes Maryhill it does not call there and the only train by which passengers can travel from Maryhill to the Milngavie branch leaves the former station at 7.48 a.m. Correspondingly the 7.45 a.m. from Milngavie to Queen Street (High Level) gives the sole local service in the day from Milngavie to Maryhill and Cowlairs, as well as between the two last-mentioned stations. This "restricted service" in the immediate neighbourhood of such a great city as Glasgow and such an important railway centre as Cowlairs is somewhat noteworthy.

An interesting Glasgow "roundabout" service is given on the Caledonian Railway by the 5.11 p.m. train from Central (High Level) to Burnside and Kirkhill *via* Mount Florida, as this train runs back non-stop from Kirkhill to its starting point *via* Carmyle and Rutherglen, and incidentally gives the sole passenger service of the day over the section between Kirkhill Junction and Westburn Junction. It leaves Kirkhill on the return journey at 5.34 p.m., and is due back in Central at 5.56 p.m., while another train which proceeds to the city *via* Mount Florida, making the usual stops, leaves Kirkhill at 5.35 p.m. and reaches Central at 5.59 p.m. —an example of a practically "simultaneous service" between two stations by widely divergent routes. Finally, until the end of January last, it was possible to travel by train without a change from the Low Level station at Glasgow (Central) to the High Level terminus directly above. The train in question was a through one from Clydebank to Central (High Level) *via* Carmyle, Kirkhill, and Mount Florida, and left Central (Low Level) at 7.47 a.m., arriving "upstairs" at 8.36 a.m. This curious service was, however, discontinued when the February time-table came into operation.

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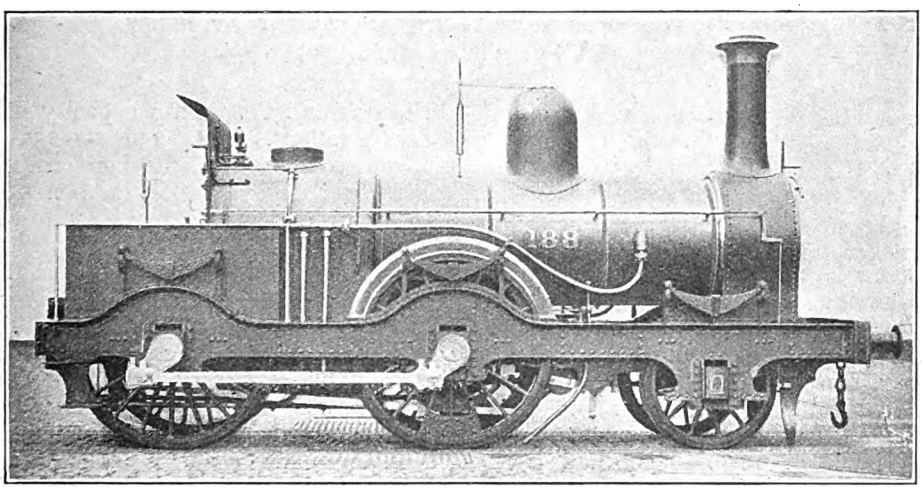
Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. II.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE next class of 2–4–0 engines to be mentioned were of the same general dimensions as the 156 series, having 6-ft. 2½-in. wheels, 16½-in. by 22-in. cylinders, and 140 lb. pressure, but in many of their constructional details they were very different. These were Nos. 170 to 199, all built in 1867 by Beyer, Peacock and Co. The frames were of a partial "sandwich" pattern, with oak blocks placed between the plates, and the valve spindles, instead of working in guides carried by the slide-bars as in the 156 class and most other Midland engines, were suspended from swing links carried from the motion plate. In their early days many of the 170 class worked the Derby–Manchester trains until they were replaced in 1874–75 by the larger 1080 class. They were all rebuilt by Mr. Johnson in 1880–83; but with the exception of No. 198, which was again rebuilt in 1892 with 18-in. by 24-in. cylinders, none of them had their power increased, and all are now broken up. They were very fast-running engines, but never seemed to be quite as powerful as the 156 class, even when the cylinders of the latter were of the same size. After 1880 Nos. 170 to 179 were always stationed at Bradford, Nos. 180 to 188 at Gloucester, Nos. 189 to 192 at Worcester; several of those, between 193 and 199, were at Kettering, and one or two, such as No. 199, worked St. Albans local trains to St. Pancras. When the through expresses from Birmingham to Cromer and Yarmouth were started after the opening of the Saxby and Bourne line, No. 198A was stabled at Saltley to run daily to Bourne and back. This engine was the last to remain in service and ended its career in 1904, the others being broken up between 1894 and 1901, except No. 197A, which



2-4-0 ENGINE No. 188 (SERIES 170 to 199). BUILT BY BEYER, PEACOCK & CO., 1867.
Coupled wheels, 6 ft. 2½ in. Cylinders, 16½ in. by 22 in. Steam pressure, 140 lb. per sq. in.

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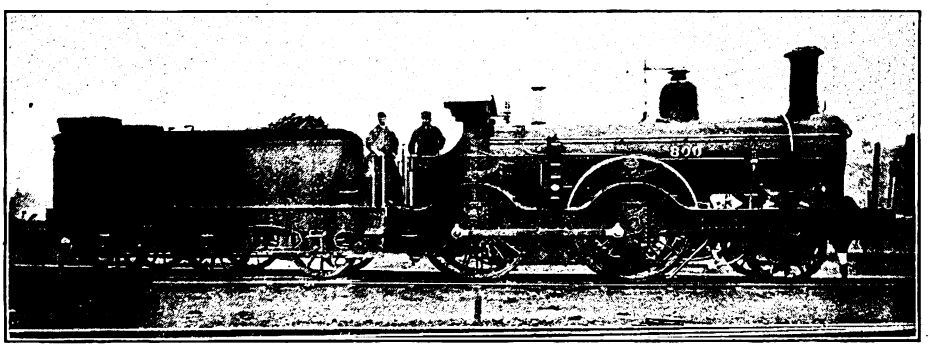
Kettering and Nottingham, Kettering and Northampton, &c.

I now come to one of the most celebrated classes of express engines that ever ran in this country, the 800 class. Many years ago there was a story current on the Midland Railway, which I believe is perfectly true, that a deputation of main-line express drivers waited upon Mr. Matthew Kirtley to put before him the inability of the old singles and many of the coupled engines with their 16½-in. by 22-in. cylinders to handle the increased weights of the trains over the heavy gradients of the Midland main lines. At the conclusion of the interview Mr. Kirtley promised the men that they would be supplied with engines which would do all that they required. And he kept his word, for shortly afterwards, in 1870–71, 48 2-4-0 express engines with 6 ft. 8 in. wheels and 17-in. by 24-in. cylinders were put to work. Of these, Nos. 800 to 829 were built in 1870 by Messrs. Neilson and Co., and Nos. 165 to 169 and Nos. 60 to 66 at Derby Works in 1870, followed by Nos. 3, 22, 23, 93, 138 and 139 in 1871. The heating surface of the 167 2-in. tubes was 989 sq. ft., and of the firebox 99 sq. ft., giving a total of 1,088 sq. ft. Weight of the engines in working order varied from 35 to 36 tons. Some of them had slightly larger boilers, with a heating surface of about 1,135 sq. ft., of which the firebox provided 104 sq. ft. The engines exhibited minor differences in some of the details, chief among which were the reversing gears. Those built at Derby had the then usual Midland pattern of quadrant, with notched sector for the reversing lever, but the 30 engines built by Messrs. Neilson had screw-reversing gear. In the case of the first 10 of these, Nos. 800 to 809, the reversing screw on the footplate was vertical with a wheel on the top, an arrangement which had the appearance of a hand-brake handle. It had also the great disadvantage that it was extremely difficult for a driver unaccustomed to these engines to see whether the motion was in fore or in back gear. In the early 'eighties a serious accident occurred at Kibworth, owing to this gear. Engine No. 809 was working the 9.15 night Scotch express from London to Leicester, when the train was stopped at Kibworth north signal-box, and in pulling up the driver reversed his wheel. On re-



2-4-0 ENGINE No. 800, AS REBUILT 1877 AND FITTED WITH WESTINGHOUSE BRAKE.
Coupled wheels, 6 ft. 8 in. Cylinders, 18 in. by 26 in. Steam pressure, 140 lb. per sq. in.
This class worked the Scotch Express for many years.

starting, owing to the darkness, he did not notice that the engine was in back-gear, and the train backed out of the tunnel into a stationary ironstone train that had been pulled up behind it. Nos. 810 to 829 were, however, constructed with the now usual form of horizontal screw reversing gear.

For the first ten years or so of their existence Nos. 800 to 811 were stationed at Kentish Town, Nos. 812 to 819 at Leeds, and Nos. 820 to 829 at Bristol. Nos. 60 to 66 and Nos. 165 to 169 were at Leicester; and of the six engines of 1871, four were at Skipton (Nos. 3, 22, 23 and 93). Nos. 138 and 139 opened the Wennington and Carnforth line, being stationed at the latter place, but after two or three years were removed to Derby. The London engines worked to Leicester;

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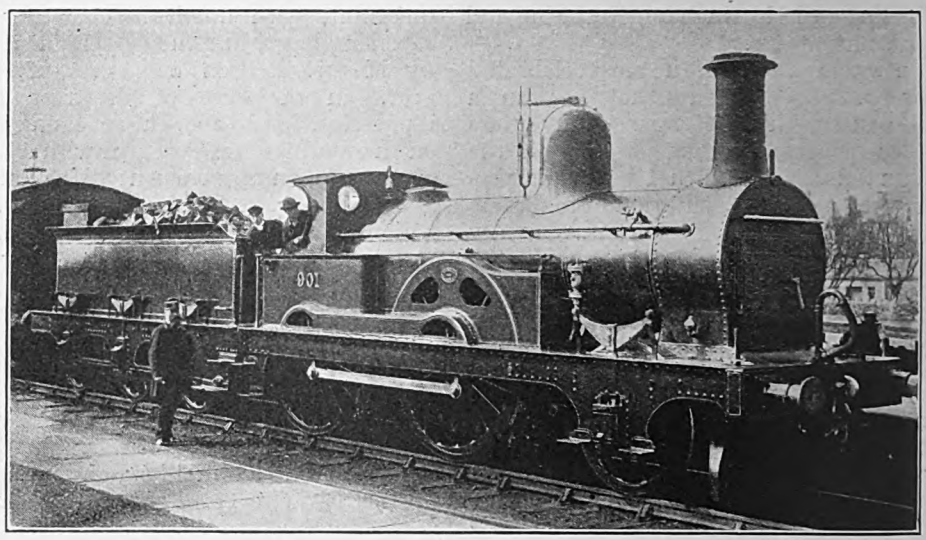


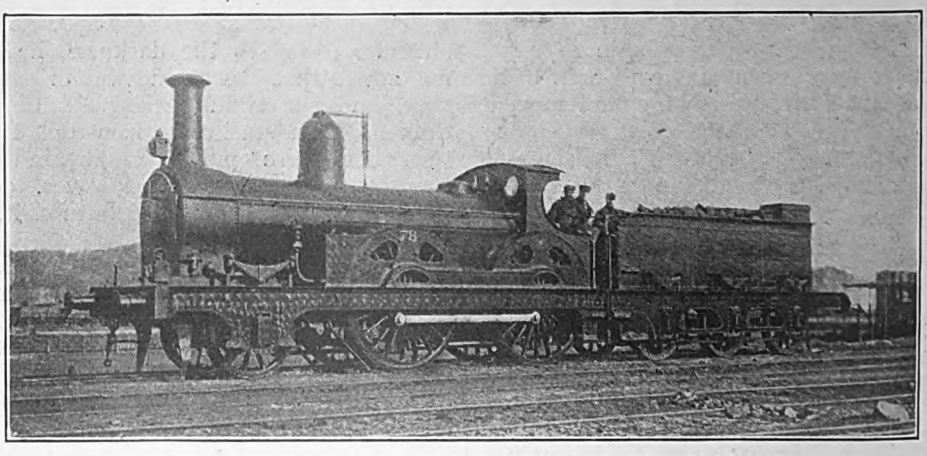
Photo. by] [*The Locomotive Publishing Co., Ltd.*

2-4-0 ENGINE No. 901 (SERIES 890 to 909). DESIGNED BY MR. M. KIRTLEY; BUILT BY NEILSON & CO., 1871.

Coupled wheels, 6 ft. 8½ in. Cylinders, 17 in. by 24 in. Steam pressure, 140 lb. per sq. in.

the Leicester engines had one link which ran to London, and a second which worked the Scotch expresses to Leeds. The Leeds men ran to Leicester and Derby, and also northwards to Carnforth, and the Bristol engines worked entirely between there and Birmingham, but never north of it.

For a few years the "800" class performed very good work on all sections of the Midland line, and in 1875 Mr. Johnson was so impressed with their capabilities that when more powerful engines were required he decided to rebuild them with enlarged cylinders and boilers. Between 1875 and 1882 the whole of the 48 engines were thus treated. The new boilers had 1,225 sq. ft. of heating surface, of which the tubes contributed 1,115 sq. ft.



2-4-0 ENGINE No. 78 (MODIFIED 890 CLASS), DESIGNED BY MR. M. KIRTLEY AND BUILT AT DERBY, 1874.

(*Photo taken at Nottingham in* 1874.)

Coupled wheels, 6 ft. 8½ in. Cylinders, 17 in. by 24 in. Steam pressure, 140 lb. per sq. in.

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The cylinders of 37 of the class were increased to 18 in. by 24 in., and of the 11 others (Nos. 169, 800, 804, 805, 807, 811, 813, 814, 816, 818 and 819) to 18 in. by 26 in. In 1889 a few of them were again provided with new boilers pressed at 160 lb.

Much of the best work of these engines was done on the Scotch expresses between London, Leicester, Leeds and Carlisle, and as these trains were for some 12 years fitted with the Westinghouse brake, a large number of the class were provided with this brake. In their enlarged state London retained Nos. 801 to 811 until 1882–84, when these engines were transferred to Skipton, and joined engines Nos. 22 and 800 which had been stationed there for some years. Nos. 818 and 819 were sent to Kentish Town and for several years worked the 10.35 a.m. and 9.15 p.m. Scotch expresses between St. Pancras and Leicester. Leeds shed retained Nos. 812 to 817, and Leicester shed also kept the 60 and 165 series, but in 1880 Nos. 820 to 829 were removed from Bristol to Bedford, where they have been for many years. Engines Nos. 3 and 23 were sent to Colne until they were rebuilt in 1882, when they were transferred to Nottingham to run London expresses. No. 93 went to Birmingham, and for a long time worked an express between Birmingham and Leeds. Lastly, Nos. 138 and 139 were stationed at Derby, to run to Leeds and York, also working to London on Sundays only.

Of my many records with these engines I will enumerate only a few. No. 816 ran from Kentish Town to Kettering, 70½ miles, in 79 min., with 135 tons; speed, 53.5 m.p.h. No. 829, with 16 coaches, about 200 tons, ran from Leicester to Kentish Town in 119 min.; speed, 50 m.p.h., and gained 3 min. over a heavy road. No. 168 ran from Bedford to Kentish Town with 14 coaches, say 175 tons, in 57 min (the booked allowance being 60 min.); speed, 50.5 m.p.h. But, probably, the best performance within my recollection was that of No. 815, which, with a train of 130 tons, ran from Carlisle up the 48¼-mile climb to Ais Ghyll signal box in 59 min., the last 11 miles being on a rising gradient of 1 in 100. The drivers used to say of these engines that "they would do anything but talk," and many of the men told me that "the harder they were thumped the better they liked it." Mr. Rous Marten mentioned that, on two occasions in 1884, one of them kept time on the up Scotch express between Normanton and Leicester, with 19 and 20 coaches respectively, without using a pilot engine.

Six of the original 48 engines have been broken up—Nos. 3, 801, 807, 810, 815, and 22. No. 815 (then No. 48) was so badly damaged in the collision of December 24th, 1910, at Ais Ghyll summit, when, as leading engine of the down night Scotch express, the train ran into two light engines, that her running days were ended. The present numbers of these engines are 23 to 67, omitting 43, 48, and 66, broken up. They are now principally stabled at Bedford, Northampton, Leicester, Leeds, and Bradford, with a few at Birmingham and Nottingham. I believe that many of them are still capable of giving a good many later and larger engines a good start and a bad beating.

The 2-4-0 engines, which followed the 800 class, were the first of the more modern design with inside bearings only for the coupled wheels and outside bearings for the leading wheels. These were known as the 890 class. Although the previous 800 class with double frames were such excellent engines, it is probably true that they broke a greater proportion of crank axles than the inside-framed engines. The diameter of the coupled wheels, 6 ft. 8½ in., and the size of the cylinders, 17 in. by 24 in. were the same as those of the original 800 class. The boilers, however, differed in having a large number (252) of smaller 1½-in. tubes, which gave 1,020 sq. ft. of heating surface, to which the firebox added 92 sq. ft., making a total of 1,112 sq. ft. Nos. 890 to 909 were built in 1871 by Messrs. Neilson & Co., and were known on the Midland for their good steaming qualities. It would appear that the small tubes transmitted the heat better than the larger 2-in. ones, but they had the disadvantage that they were more easily choked with ashes, and required more careful cleaning out. Mr. S. W. Johnson afterwards compromised in the matter of tube diameter by adopting a half-way size of 1¾ in. as standard for many years, and in 1885 he reduced the tubes to 1⅝ in.

Forty-two additional engines, all built

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at Derby, of similar general dimensions and design followed Nos. 890 to 909; these, however, varied somewhat in detail. In all of them the side panels at the footplate end were replaced by trailing splashers similar to those over the driving wheels, and the numbers were carried on the driving splashers. Of these, Nos. 2, 90, 92, 95, 125, and 148 came out in 1872, and were the last express engines to have Mr. Kirtley's double folding smokebox doors, for the later engines had the more modern form of dished circular doors. In 1873–4 there appeared Nos. 5, 7, 12, 19, 21, 40 to 49, 67 to 69, 72, 78, 91, 120, 121, 123, 124, 127, 131, 132, 151, and 152. Although a number of these had appeared after Mr. Johnson's arrival, they all had the round-topped Kirtley domes. The last six, built in 1874–5, Nos. 126, 128, 130, 134, 135, and 136, had, however, Mr. Johnson's larger boilers with 1,225 sq. ft. of heating surface, with his style of domes and safety valves.

Although Mr. Johnson supplied many of the earlier engines of 1872–4 with boilers similar to those of No. 126, &c., during the period 1875–8 he did not enlarge the cylinders until the engines underwent a second rebuild in 1885–95, when all the 62 engines were fitted with new 18-in. by 24-in. cylinders, and closed splashers of the usual Midland pattern. During their early days, engines 890 to 909 were employed chiefly on the main line, between Leeds, Leicester, and London. In 1880, Nos. 890 to 899 were all stationed at Derby, and ran to Manchester, Leeds, York, Birmingham, and Leicester. Nos. 900 to 904 were at Normanton, and worked the Scotch expresses between Normanton and Skipton, for which purpose they were all fitted with the Westinghouse brake. They also worked Scotch fish trains to London. Nos. 905 to 909 oscillated between Skipton and Sheffield sheds, until eventually all of the 900 to 909 series arrived at the latter place, where they remained for many years, with the exception of 901 and 902, which eventually went to Lancaster.

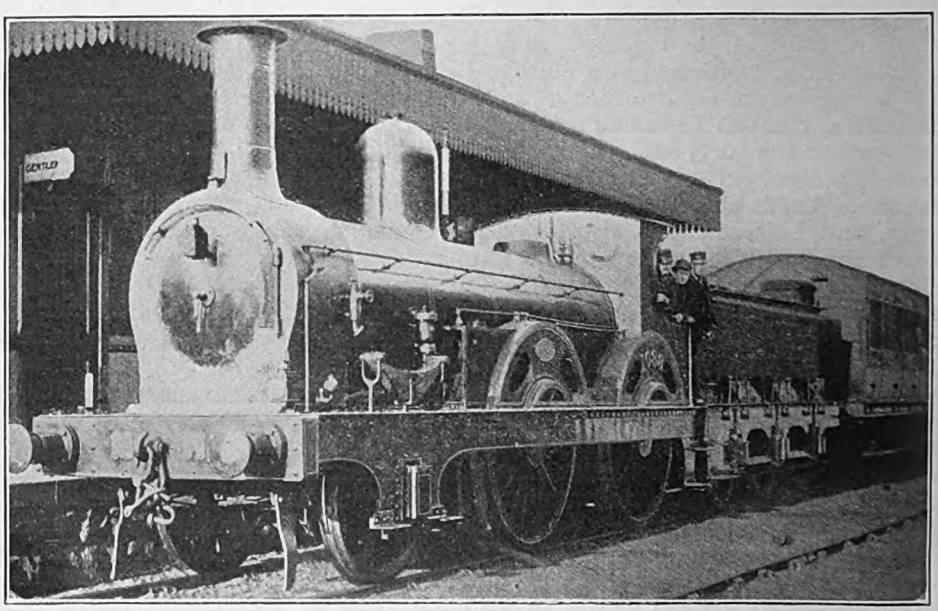

Photo.] [*Loco. Publishing Co., Ltd.*

2-4-0 ENGINE No. 1088 (SERIES 1070-1089). DESIGNED BY MR. M. KIRTLEY; CONSTRUCTED BY SHARP, STEWART & CO., 1874.

Coupled wheels, 6 ft. 2½ in. Cylinders, 17 in. by 24 in.

The other 42 engines with odd numbers were distributed all over the Midland system. Nos. 2, 5, 7, and 12 were at Carnforth until 1878; and 19 and 21 at Lancaster during the same period, and

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worked entirely between those places and Leeds or Bradford. Afterwards they were transferred to the Nottingham district. Nos. 40 to 42 were at first fitted with the Westinghouse brake, and were quartered at Leeds; but in 1876, 40 to 49 became the property of Sheffield shed, and worked local and semi-fast trains to Leeds, and to Derby and Nottingham. They are still in this district, but are now stationed at Hasland (Chesterfield). Nos. 72 and 78 were Nottingham engines; Nos. 67 to 69, Leicester; the 90 and the 120 series at Birmingham; and the 130's at Derby. In 1878, Nos. 132 and 135 were fitted with Barker's hydraulic continuous brake, to work local trains from Bedford to St. Pancras. In 1889, when locomotive working on the West road was altered, and the Derby engines and men began to work through to Bristol, Nos. 890, 892, 894, and 896, together with No. 139 of the 800 class, were called upon to form a special link for this service, on which they remained until superseded by 4-2-2 single engines some three years afterwards.

Of the original 62 engines of this class, about 55 are still at work, bearing the present numbers—between 68 and 126. They are distributed throughout the Midland system, and are now almost entirely employed upon local trains. London readers may see Nos. 110 and 111 (old 151 and 152) at St. Pancras, on the local service from St. Albans.

They have always been good engines. A celebrated run was once made by No. 906, during the late 'seventies' with a special train of six six-wheeled coaches, from Derby to St. Pancras. I give what was stated to have been the official record, but I cannot vouch personally for its exactitude.

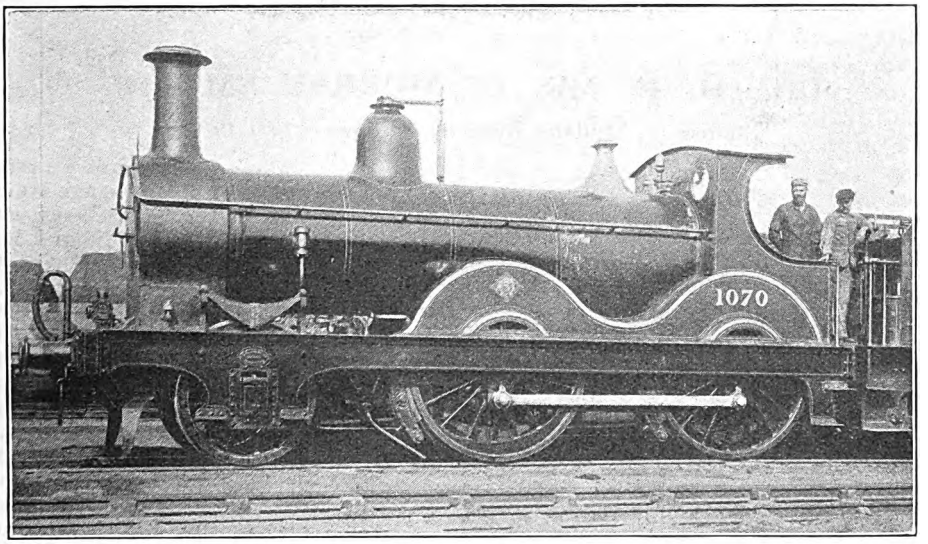

Photo.] [*G. F. Burtt.*

2-4-0 LOCOMOTIVE No. 1070 (1070-1089 SERIES) AS REBUILT BY MR. S. W. JOHNSON, 1887-1890.

Coupled wheels, 6 ft. 2½ in. Cylinders, 18 in. by 24 in. Steam pressure, 140 lb. per sq. in.

Miles.		Speed m.p.h.
	Derby, dep. 2.30 p.m....	
33½	Wigston, arr. 3.7 p.m....	54·3
	Wigston, dep. 3.12 p.m.	
79¼	Bedford, arr. 4.0 p.m....	57·2
	Bedford, arr. 4.3 p.m....	
	St. Pancras, arr. 5 p.m.	52·4

It was stated that, on this run, No. 906 covered one stretch of 17 miles between mileposts in 13 min. 28 sec., a speed of 75.6 m.p.h.

The last Kirtley passenger engines to be delivered to the Midland were Nos. 1070 to 1089, built by Sharp, Stewart & Co.

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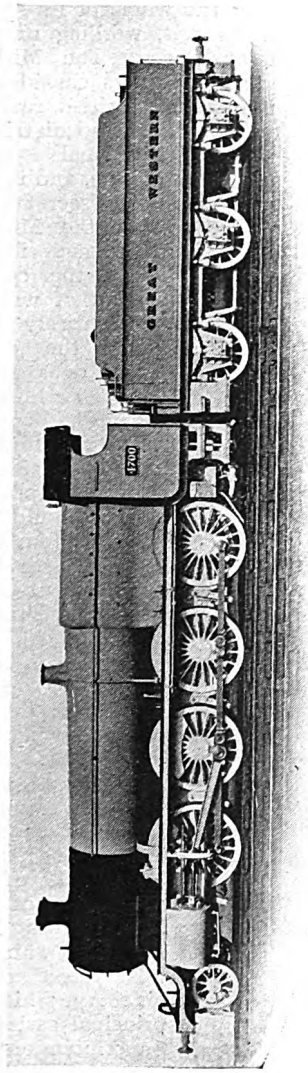
The First Eight-coupled "Mixed Traffic" Locomotive.

MR. G. J. CHURCHWARD'S NEW 2-8-0 ENGINE, G.W.R.



[*G.W.R. Magazine.*

2-8-0 MIXED TRAFFIC ENGINE, GREAT WESTERN RAILWAY.
Designed by Mr. G. J. Churchward, Chief Mechanical Engineer.

By courtesy]

LOCOMOTIVES of eight-coupled types are frequently employed for working passenger trains, as well as goods and mineral, over mountain grades; but as far as we are aware, unless it be in South Africa, it is quite novel for such engines to be designed with a direct view to what are known here as "mixed traffic" duties. It is true that in places, particularly in South Devon, between Newton Abbot and Plymouth, Great Western main-line gradients are essentially of a mountain character; but it is to be presumed that the new design has been prepared with a view to a wider range of traffic working than is involved by that section. Consequently it appears to be correct to describe No. 4700 as the first eight-coupled engine designed expressly for mixed-traffic duties, certainly in the United Kingdom, and probably in the world's practice.

The design is developed from the highly successful 2-6-0 mixed-traffic engines with 5 ft. 8 in. coupled wheels, but has a large boiler as associated with ten-wheeled classes in service. It necessarily includes usual features of Great Western practice.

Leading dimensions are :—

Cylinders	.. ..	19 in. by 30 in.
Coupled wheels	..	5 ft. 8 in. diam.
Leading wheels	..	3 ft. 2 in. diam.
Steam pressure	..	225 lb. per sq. in.
Heating surface :—		
Tubes	.. ..	1,686 sq. ft.
Firebox	.. ..	155 ,,
Superheater	..	330 ,,
Firebox	..	2,171 ,,
Grate area	.. ..	27 sq. ft.
Tractive effort	..	30,460 lb.
Tender capacity :—		
Water	.. ..	3,500 gall.
Coal	.. ..	6 tons.

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Retirement of Lt.-Col. Cecil W. Paget, R.E., C.M.G.. D.S.O.

GENERAL SUPERINTENDENT, MIDLAND RAILWAY.

LIEUT.-COLONEL CECIL W. PAGET, R.E., C.M.G., D.S.O., has retired from the post of General Superintendent of the Midland Railway. Since the early stages of the war he has been engaged in various positions of great importance on the military railways in France, which afforded him plenty of scope for the initiative and original thought which constitute one of the characteristics of his career on the Midland Railway. During his absence his work has been ably carried on by Mr. J. H. Follows, C.B.E. who has been Acting General Superintendent since the early part of 1917, and has now been appointed to succeed him.

LIEUT.-COL. C. W. PAGET, C.M.G., D.S.O.,
General Superintendent,
Midland Railway, 1907–19.

"By the retirement of Lieut.-Colonel Paget," says the *Railway Gazette*, in an appreciation published under the heading of "An Original Operating Officer," "the railway world loses an operating officer of outstanding originality and ability, and one who has certainly left his mark on the development of British railways as a whole. Trained as a locomotive engineer, it was as an operating officer that he made his mark. Colonel Paget was responsible for many innovations in railway operation, but his greatest work was, of course, the installation and the introduction of the Midland system of traffic control. Since then numerous other railways have adopted various forms of traffic controls which have been described from time to time in our pages, but the Midland was certainly the first of our great railways to make a bold plunge and operate practically the whole of its system through district controls, working under a central control at Derby. The Midland system of organisation differs considerably from that of most other British railways in that there are practically no district or divisional traffic officers, and it is an open secret that when the Midland directors decided to adopt the control system of working and entirely reorganise the operating department, traffic working on the line had got into a very congested and unsatisfactory state. One possible remedy would have been extensive widenings and the appointment of district officers to superintend the working on different sections of the line, but it was decided to make a bold experiment. Mr. Cecil Paget, as he then was, was appointed General Superintendent. The whole of the operation of the line, including locomotive running, was placed under his charge; his four principal assistants having the titles of Superintendent of Operation; Superintendent of Motive Power; Superintendent of Passenger Service, and General Passenger Agent. A careful investigation was made to arrive at what was the utmost workable running capacity of various sections of the line, and the 'path' system introduced with the various district control offices working under the central control at Derby.

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"How successful this system of operation has proved was shown by some points in the chairman's speech at the last annual meeting of the Midland Railway Company at Derby. In the course of his speech the late Mr. G. Murray Smith—whose sad and sudden death is referred to elsewhere—compared the operating figures of 1913, the last complete year of railway working under pre-war conditions, with 1907, at the end of which year the old Superintendent of the Line's department was reorganised, and the control system of working was introduced in 1909. In 1913 the tonnage carried was 50,500,300 tons, an increase of 3,237,000 tons over 1907; but in spite of that increase in tonnage the train miles run were 1,650,000 less than in 1907, the delays to trains were less by 702,400 hours, and the coal consumed was less by 93,160 tons; fewer train miles, less delay, and less coal all mean a large saving of money. The traffic receipts in 1913 were £13,297,000, an increase of £830,750 over 1907, while the dividend on the deferred stock—which in 1907 was £2 17s. 6d. per cent.—rose to £4 5s. per cent. Thus each holder of £100 deferred stock received £1 8s. 6d. more than in 1907; and at the same time the appropriation to reserve for the five years to December, 1913, rose to £2,708,185, an increase of £2,414,930 over the five years ended December, 1907."

RECIPIENTS OF "SAFETY FIRST" BADGES: LONDON, BRIGHTON & SOUTH COAST RAILWAY.

The Earl of Bessborough, K.P., Chairman, London, Brighton & South Coast Railway, in the presence of Sir William Forbes, General Manager, Mr. J. J. Brewer, Secretary, and Mr. H. A. Sire, the Goods Manager, in the board room at London Bridge, recently presented 1st Class "Safety First" badges to eight carmen, viz., R. Brown, C. Collins, W. Tongue, A. Huckwell, C. Hazell, J. G. Broyd, W. Wigery and C. Pisey, for freedom from accident in the streets of London for 12 months. The photograph shows the men whose names are mentioned, together with the Earl of Bessborough.

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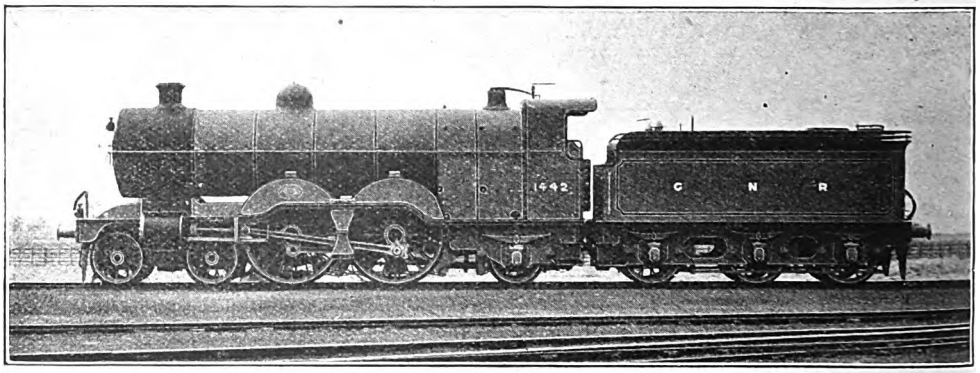
The Kitchener Record Run.

A NOTABLE PERFORMANCE BY GREAT NORTHERN RAILWAY LOCOMOTIVES.

IN the March RAILWAY MAGAZINE, reference was made to a special run made by the Great Northern Railway in connection with Lord Kitchener's last railway journey, to join the *Hampshire* in the far north. About half-an-hour after the departure of the special conveying his lordship and suite, a representative of the Foreign Office arrived at King's Cross with important documents, and stated that he must catch the special, as it was necessary for him to sail with the party. There was only one course to adopt, and this was done. An impromptu special was hastily arranged, and the train worked to Doncaster so speedily that it passed the 156 mile post in the record time of 149 min. (after a 4-min. stop to change engines at Grantham, and 4 min. lost by relaying). Lord Kitchener, who had been advised by telephone at Grantham what was being done, decided to wait a short time at York for the arrival of the second special, which duly arrived, and enabled the passenger with the despatches to join the party, with whom he subsequently perished.

This run has aroused considerable interest, and, by the courtesy of Mr. H. N. Gresley, Locomotive Engineer, Great Northern Railway, we are enabled in collaboration with the *Railway Gazette*, to give further particulars, and to illustrate the two engines employed, besides referring to the special train which it followed.

The first special, conveying Lord Kitchener and his suite, consisted of four vehicles, representing 16 pairs of wheels. These were main line corridor coaches, totalling a weight of from 100 to 112 tons. The engine was of the "Atlantic" type. No. 252, driven by Driver H. Collarbone, with A. Stevens as fireman. The train left King's Cross passenger station at 5.45 p.m., and reached Grantham, 105 miles, at 7.42, an average speed of 53.9 m.p.h. Weather was rainy, and 3 min. were lost on the journey, owing to slackening of speed due to relaying. From Grantham to York the train was taken by another "Atlantic" type engine, No. 284. Wind and rain were still encountered, and the train was delayed for traffic purposes 1 min. at Grantham, whilst 10 min. were lost by signals near Doncaster. The train left Grantham at 7.46 p.m., the driver being A. King, and the fireman H. W. Hall. It reached York at 9.34 p.m. Average speed from Grantham to York, inclusive of delays,



4-4-2 ENGINE No. 1442, WHICH TOOK THE SECOND "KITCHENER" SPECIAL FROM KING'S CROSS TO GRANTHAM, JUNE 4, 1916.

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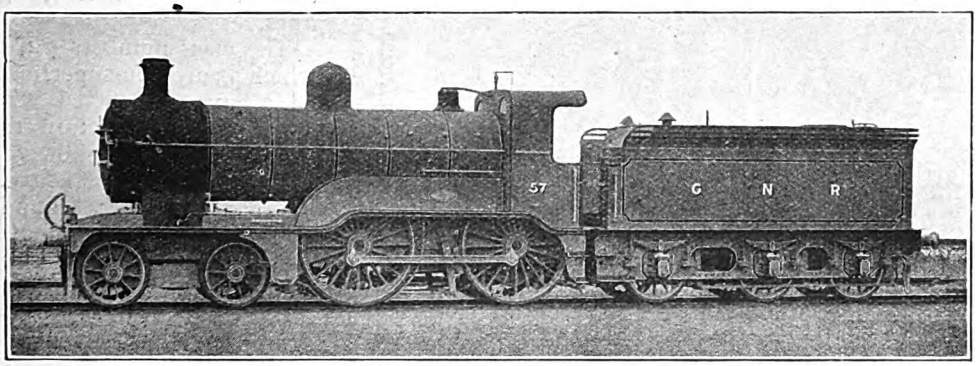
was therefore 46·1 m.p.h. This train ran on practically a normal schedule, nothing being attempted in the way of extra fast running.

The second special, however, conveying the despatches, was booked through at as high a speed as circumstances permitted. It was assembled at King's Cross at very short notice; the engine was No. 1442 of the "Atlantic" type, which happened to be standing pilot at the time. The driver, J. Day, was not the regular driver for this engine, but was sent out with the special train, the other man being off duty at the time. The train consisted of two main line coaches, or eight pairs of wheels, exclusive of engine and tender. It left at 6.56 p.m., passed Hatfield (17¾ miles) having thus occupied 1 hr. 41 min. net running time, or with 4 min. deducted for slacks 1 hr. 37 min., or, roughly speaking, 65 m.p.h. At Grantham, a 4-4-0 type engine, No. 57, driver R. Robinson, was attached. The train left at 8.40 p.m., passing Newark 8.54, Retford 9.10, Doncaster 9.25, Shaftholme 9.29, and arriving at Selby 9.43, leaving again at 9.48 and arriving York at 10.17 p.m. From Shaftholme onward the special was delayed by a North Eastern Railway train in front, resulting in the loss of 18 min. The run from Grantham to York (83 miles) was thus performed, exclusive of stops, at a trifle over 63 m.p.h.

It will thus be seen that the second special started from London 1 hr. 11 min.



4-4-0 ENGINE No. 57, WHICH TOOK THE SECOND "KITCHENER" SPECIAL FROM GRANTHAM TO YORK, JUNE 4, 1916.

at 7.16, Hitchin 7.28, Sandy 7.38, Huntingdon 7.51, Peterborough 8.6, and arrived at Grantham 8.37 p.m., the 105 miles after the first train, but arrived at York, in spite of the loss of 18 min., only 43 min. after the arrival of the first special.

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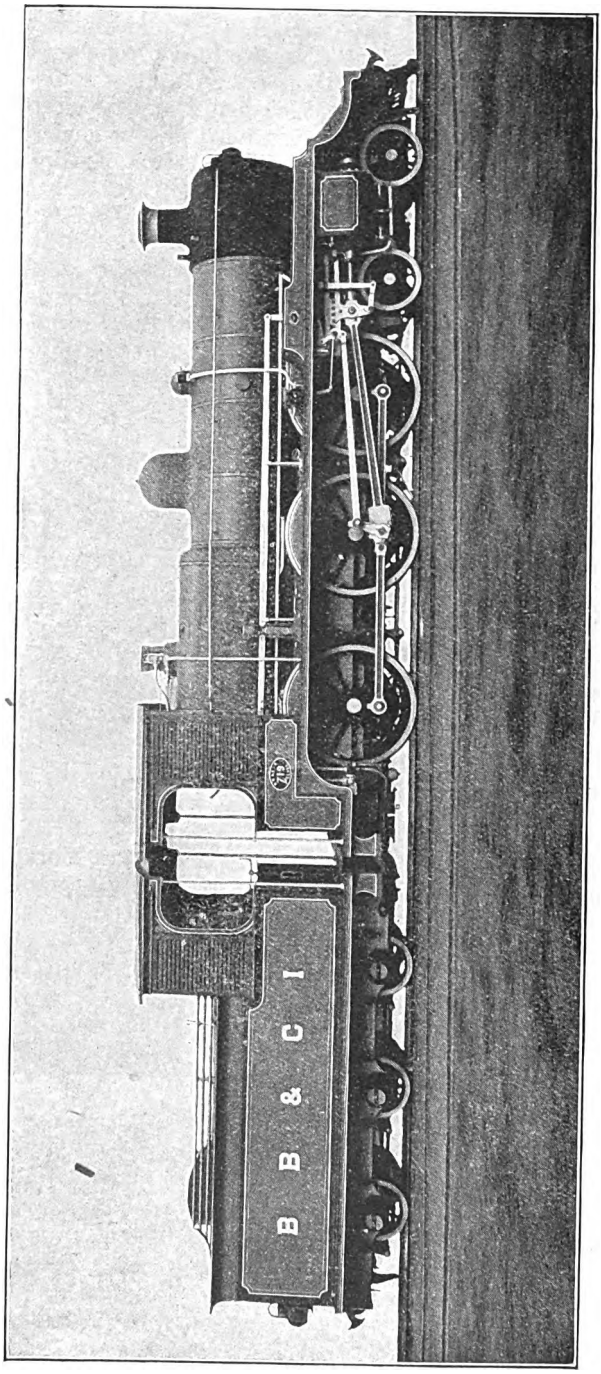
An Indian Built 4-6-0 Locomotive.



METRE-GAUGE 4-6-0 LOCOMOTIVE: BOMBAY, BARODA & CENTRAL INDIA RAILWAY.
Fitted with superheater, top-feed and Wakefield patent mechanical lubricator.

FOR some time past all locomotives built for the metre gauge lines of the Bombay, Baroda & Central India Railway have been constructed at the Ajmar workshops, with materials partly obtained from England and partly supplied by the Tata Iron & Steel Works in India. The engine illustrated is one of a series designed by Mr. W. S. Fraser, Locomotive Superintendent, metre gauge lines.

The class numbers 72, of which 53 are non-superheated, 3 have been fitted with superheaters but retain the ordinary balanced slide valves, 16 have superheaters and piston valves; 1 has in addition a feed water heater and pump, and 7 have a top feed arrangement. No. 719 illustrated includes superheater, piston valves, top feed, and the well-known Wakefield mechanical lubricator. The last mentioned is clearly visible in the illustration. It is placed on the leading coupled wheel splasher, and worked from the link of the Walschaert valve motion.

Leading dimensions are:—

Cylinders	16½ in. by 22 in.
Coupled wheels	4 ft. 9 in. diam.
Steam pressure	145 lb. per sq. in.
Heating surface—	
Tubes	703 sq. ft.
Firebox	108 ,,
Superheater	163 ,,
Total	975 ,,
Grate area	16 sq. ft.
Weight of—	
Engine in working order	37.2 tons.
Tender in working order	24 tons.

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The Why and the Wherefore.

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which was published in April,* 1919, *price* 5*s. net, by post* 5*s.* 6*d.*

Pullman Cars in Great Britain.

All Pullman cars operated on the various British railways are the property of the Pullman Car Company, Limited. There is no rule governing the exterior colours in which the cars are painted, but they generally correspond with the coaching stock on the lines on which they run. There are no varnished teak cars on the South Eastern and Chatham Railway. All the cars on this line are in crimson lake, corresponding to the coaches on the same railway. The cars on the London, Brighton and South Coast Railway are umber and cream, and differ from the Brighton Railway's coaches. There are two Pullman cars on the Metropolitan Railway, and 10 on the Caledonian Railway. On the London, Brighton and South Coast Railway there are 28 named cars and 11 numbered cars, making 39 in all. The numbered cars are third-class. There are 27 cars working on the South Eastern and Chatham Railway, and 18 more are being built for use on that line. When the latter are brought into traffic there will be 96 Pullman cars in service on British railways.

[Reply to "PULLMAN."]

Scotch Expresses.

Tank engines have never, as a regular thing, been employed to work the Scotch expresses on any of the three competing routes, although it is possible that, as an exceedingly rare occurrence, owing to the failure of an express engine *en route*, a tank locomotive has been so used for a short distance, as being the only engine immediately available. It is not a question of a tank engine being *powerful* enough, but rather of its being *suitable* for such work, in respect of wheel diameter, a boiler sufficiently large for sustained steaming at speed, and an adequate supply of coal and water. On the Midland, Great Northern, and North Eastern Railways, which you specifically mention, only the "D" class 4-4-4 tanks of the last-mentioned are capable of express work, but we doubt whether even they could handle trains at speed of the weight of the present East Coast expresses.

[Reply to M. H.]

A Little-known Railway in South Wales.

The direct line from Pontypridd to Penrhos Junction, Caerphilly, is the property of the Alexandra (Newport and South Wales) Docks and Railway Company, although not physically connected with the parent system. By arrangement with the Great Western Railway, the latter works the passenger traffic over this section, which takes the form of rail motors between Newport and Pontypridd, but the service in question is at present suspended. These cars have one of the most curious journeys on record, as in the course of 18¼ miles they run over the metals of five companies, *i.e.*, Taff Vale Railway for ¼-mile, Alexandra Docks line to Penrhos Junction (6¾ miles), Rhymney Railway through Caerphilly (1½ miles), Brecon and Merthyr Railway to Bassaleg Junction (8½ miles), and Great Western Railway, thence into Newport High Street (2½ miles).

[Reply to "SOUTH WALES."]

Locomotive Efficiency.

Of the coal used on a locomotive the proportion of latent energy finally available for tractive effort is very small, not exceeding 4 per cent. on the average. An analysis of the losses reveals the fact that of 100 units of heat supplied in the

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form of coal, no less than 36 pass directly into the chimney, some 64 being taken up by the boiler. The combined effort of boiler and engine results in only 5 of the original units appearing in the form of mechanical energy, of which 4 are available for overcoming resistances and producing tractive effort. The consumption of fuel on a locomotive is estimated at 6-lb. per horse-power per hour.

[Reply to CADET P. L. B. WILLS.]

Locomotive Working, 19th Century.

Although the RAILWAY MAGAZINE parts for January, February, and March, 1919, containing first three instalments of Mr. Ahrons' London Brighton and South Coast Railway articles are out of print, the bound half-yearly volume (No. 44) containing them and also the April, 1919, issue containing the fourth and last instalment of the Brighton locomotive series is in binders' hands. The volume, bound in RAILWAY MAGAZINE standard red cloth gold-lettered cases will be sold at 10s. each; by post 10s. 6d. As the number available is small the bound volume will soon be out of print.

[Reply to HERBERT CLARKE.]

Pullman Cars on the London and South Western Railway.

There has been no Pullman car working on the London and South Western Railway since the end of 1911, prior to which there were four cars running between Waterloo and Bournemouth for several years. They were eight-wheelers, and their names were *Duchess of Albany, Duchess of Connaught, Duchess of Fife,* and *Princess Margaret.* These cars were withdrawn in consequence of the decision of the London and South Western Railway Company to run corridor stock with dining cars on their fast trains between London and Bournemouth.

[Reply to G. R. D. BENNETT.]

"Atlantic" Fireboxes.

You are quite in error in stating that the grate area of a large Great Northern Railway "Atlantic" is "very much less" than that of a North Eastern Railway or North British Railway "Atlantic." In point of fact the figures are 31, 27 and 30 sq. ft. respectively. It is only in the Great Northern and London, Brighton and South Coast Railway "Atlantics" that advantage has been taken of the possibility of using a wide fire-box, extended across the frames behind the coupled wheels, instead of the usual practice of building the fire-box between the frames.

[Reply to A. HEWITT.]

Distinguishing Superheater Locomotives

As we have already explained, an extended smokebox is frequently an indication that an engine is superheated, but neither this nor other usual means of identification is conclusive. As you point out, many superheated engines do not have an extended smokebox, particularly if they were already provided with one of considerable size. Many rebuilds, also, include the extended smoke box without superheater, as, for example, the rebuilt 4-4-0 engines on the London, Brighton and South Coast Railway you mention.

[Reply to "SUPER-URIE."]

A North Eastern Query.

We cannot undertake to answer queries as to dates and classes of isolated locomotives, as the rules at the head of these columns clearly indicate. On the North Eastern Railway the class of each locomotive is painted in white letters on the buffer beam, and the date of construction is given on the number plate. Surely, as you live in the neighbourhood in which this engine is at work you can ascertain the information you desire with a great deal less trouble than it gives us to secure it by correspondence or otherwise.

[Reply to G. D. RUSSELL.]

Train-timing.

So far as we know no railway companies employ persons exclusively for the purpose of timing trains. It is seldom that timings are required for railway purposes in such close detail as appears in these columns, except, perhaps, in connection with dynamometer car work, which is carried out entirely by experienced men, who have, in most cases, been through the locomotive works. On these occasions records have to be taken of many other things than mere times.

[Reply to NORMAN NORTH-SMITH and H. J. BRADSELL.]

Pilning Bank, Great Western Railway.

There are certain cases in existence, of which this is one, where it has been necessary to excavate an up line to a

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considerable depth, in order as far as possible to ease the adverse gradient, while considerable excavation has been saved by separating the down line and carrying it for some distance on a higher level, with a steeper subsequent descent, to the point where it rejoins the up line. A similar thing can be seen at Princes Risborough, on the Great Western and Great Central Joint Line.

[Reply to A. V. L. PILLINER.]

Shap and Beattock Banks, Northern Gradients.

From Penrith, coming south, the gradient is not specially hard for about 4 miles, but is followed by 6¼ miles of 1 in 125, with a final 2 miles of about 1 in 125 to Shap Station. The actual summit involves another mile at about the same incline. Approaching Beattock from the north, gradients are approximately 1 in 300 against the load, steepening beyond Abington to 1 in 150, and concluding with 2¼ miles at 1 in 100 between Elvanfoot and the summit.

[Reply to F. J. GALER.]

Margate West Station, South Eastern and Chatham Railway.

There are now five platforms, as follows :—

Length as existing: Platforms No. 1, 620-ft. down line; 2, 790-ft. up line; 3, 486-ft. bay; 4, 800-ft. bay; 5, 790-ft. bay (this will subsequently be reduced to 710-ft.). *Length when remodelling is completed*: 620-ft. down line; 790-ft. down line; 775-ft. up line; 938-ft. up line; 710-ft. bay. In due course it is the intention to concentrate all traffic at Margate West Station instead of Margate Sands.

[Reply to J. S. BARTLETT.]

Engine Sheds, Great Western Railway.

The following are the principal :—Old Oak Common, Southall, Slough, Reading, Swindon, Didcot, Oxford, Banbury, Gloucester, Westbury, Bristol (Bath Road), Bristol (St. Philips), Weymouth, Taunton, Newton Abbot, Exeter, Laira, Plymouth, Wolverhampton, Birkenhead, Shrewsbury, Oxley, Tyseley, Worcester, Hereford, Newport (Ebbw Junction), Newport (Dock Street), Severn Tunnel Junction, Pontypool Cardiff, Tondu, Neath, Carmarthen, Fishguard.

[Reply to G. W. M. R.]

4-6-0 Locomotives, London and North Western Railway.

The "Claughtons" are considerably the bigger engines, though the "Prince of Wales" series are powerful locomotives and capable of very fine work. The latter class was inaugurated before the "Claughtons," as they are really superheated "Experiments," but both series have been added to more or less contemporaneously. Please note the rules at the head of this section in regard to supplying lists of engines.

[Reply to F. PERMAN.]

Model Locomotives.

For realistic models to scale, Bassett-Lowke, Limited, Kingswell Street, Northampton, and 112, High Holborn, London, W.C.2, have earned an enviable reputation. We understand a new catalogue is in preparation. Another firm, W. H. Jubb, Limited, Railway Department, Brittain Street, Sheffield, is advertising a scale model, gauge 1, at a very low price. This firm of model makers will send a catalogue on receipt of 9d. in stamps.

[Reply to "AJAX."]

A Locomotive Difficulty.

The regular puffing of a South Eastern and Chatham Railway passenger engine while stationary, to which you refer, was in all probability, the exhaust of the Westinghouse pump, or air-compressor, with which a certain number of the engines of that company are equipped, in order that they may, when required, work Westinghouse-fitted stock. A somewhat similar noise is made by locomotives fitted with the Weir feed pump apparatus.

[Reply to "SPHEROID."]

Great Central Locomotives.

There are six 4-6-0 engines of the *Sir Sam Fay* type, Nos. 423 to 428 inclusive, but these work principally north of Nottingham, *Lord Faringdon* being the only large passenger 4-6-0 stationed at Neasden shed. Your query as to piloting on the Great Central Railway was dealt with at length in Mr. Cecil J. Allen's article in the November, 1918, issue. Your second query does not give sufficient data to be capable of answer.

[Reply to "QUERY."]

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Gradient Profiles.

Didcot-Birkenhead gradient profiles, Great Western Railway, were published in the RAILWAY MAGAZINE for July, 1903, and from Yeoford Junction to Barnstaple, London and South Western Railway, September, 1904. These and other sections of various lines have also been dealt with in articles dealing with particular routes from time to time. Your suggestions for other articles on the subject are being kept in view.

[Reply to C. A. HUNT.]

"R.O.D."

These initials signify Railway Operating Division, and were used for all engines and material engaged on the Army and other lines operated by the military authorities in France, the railway troops thus concerned also being known as the "R.O.D." We are glad to hear that THE RAILWAY MAGAZINE is so popular among railwaymen in the Army, of which we have had many other indications.

[Reply to J. W. URION.]

"Single" Engines, North Eastern Railway.

So far as we are aware, none of the 4-2-2 engines of this company, comprised in Classes I (7 ft. wheels) and J (7 ft. 7 in. wheels) have yet been scrapped. Such as are at present on active service work principally in the Leeds-York-Scarborough-Bridlington-Hull area. Your second query is of a type we do not undertake to answer.

[Reply to IVAN D. APPLETON.]

Great Western Railway Four-Track Sections.

There is no other 4-track section of the Great Western Railway comparable in length to the main line from Paddington to Steventon. Next in importance, probably, comes the section from Olton through Birmingham to Smethwick Junction, 8½ miles. Beyond this there are other shorter examples, too numerous to mention here.

[Reply to G. W. M. R.]

Sand-Boxes of American Locomotives.

In America sand-boxes are invariably placed upon the top of the boiler in order that the sand may be kept dry. The steam-dome is therefore flanked on either side by a sand-box similar in shape (one between the chimney and the steam-dome to sand when the engine is in forward gear, and the other when it is in reverse) which accounts for the three "domes" to which you refer.

[Reply to GEORGE ROBINSON.]

4-6-4 Tank Engines.

In addition to the large express tank engines of the London, Brighton and South Coast Company having this wheel arrangement, the Midland is the only other English line using 4-6-4 tanks, eight such engines —Nos. 2100-2107 inclusive—having been taken over with the London, Tilbury and Southend locomotive stock. In Ireland, the County Donegal Joint Committee employs 4-6-4 narrow-gauge tank engines.

[Reply to "X.Y.Z."]

Dornoch Light Railway.

In pre-war days, and during the height of the season, through coaches were often run to Dornoch, while, occasionally, sleeping saloons were sent through to suit the convenience of passengers. We are not certain as to whether either course was adopted regularly at any time. The engine employed on the branch is a 0-6-0 tank.

[Reply to G. R. D. BENNETT.]

"Train Indicator in Box."

This sign on Great Western Railway starting signals indicates that the signalman is apprised automatically of the fact that a train is standing at the signal in question by track circuiting or other means, and that the engine fireman is thereby relieved of the necessity of proceeding to the signal-box in pursuance of the well-known Rule 55.

[Reply to "PECKETT."]

North Eastern Locomotives.

Numbers of the special 4-8-0 3-cylinder tank engines employed in marshalling yards (Class X) are 1350 to 1359 inclusive. As regards future construction for this company, 50 superheater 0-8-0 mineral tender engines of class T2 are at present on order, at the newly inaugurated locomotive works of Messrs. Armstrong, Whitworth and Co., Elswick-on-Tyne.

[Reply to A. DICKINSON.]

Great Northern Railway "Moguls."

No. 1630 was painted green at the time of her construction, as correctly represented in our coloured frontispiece to

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which you refer, but has since that date been painted grey, as a war measure, in common with all the other engines of this wheel arrangement. Your other query transgresses the rules.

[Reply to T. S. Ross.]

Portsmouth and Horndean Light Railway.

This, as also the Blackpool and Fleetwood Tramroad, is a light railway of tramway character. It is 6 miles long and employs 16 cars. The Blackpool and Fleetwood has 8 miles of track and 41 cars. Both have been described in early numbers of THE RAILWAY MAGAZINE, long since out of print, but not recently.

[Reply to R. A. LEATHLEY.]

Gradients on the West of England Section, Great Western Railway.

A portion of the west side of Dainton Bank (between Dainton Summit and Totnes) is inclined at 1 in 37, and is therefore steeper than the incline you mention. See Mr. W. J. Scott's article in the September, 1918, issue.

[Reply to "PECKETT."]

"S.M.L."

We do not quite understand your query, but suggest that you refer to indications that cattle wagons so marked are fitted with adjustable partitions enabling them to be adapted as "small," "medium," or "large" wagons, according to requirements, this affecting the rate of charging.

[Reply to A. V. L. PILLINER.]

"E.F.B."

These indicate "Electric Fouling Bars," and notify places where locomotives or odd vehicles must stand in order to record platform occupancy or a point fouling position to the signalling staff. Complete trains naturally extend over at least one of these bars.

[Reply to "E. F. B."]

Cheltenham-Gloucester Section, Midland and Great Western Railways.

You are correct in pointing out that in replying to "Season Ticket Holder" last month, ownership of the Cheltenham—Churchdown and Churchdown—Gloucester sections was stated reversely. The section is treated as joint for traffic purposes.

[Reply to J. W. NEWMAN.]

Compound Locomotives, Great Northern Railway.

Nos. 1421 and 292, the two compound "Atlantics," as well as No. 1300, the simplified compound, are still at work. They are stationed at Doncaster, and share in all the ordinary express running of that shed.

[Reply to A. F. H. BRISCOE.]

"Atlantic" Type Locomotives.

The Great Central Railway has thirty-one tender locomotives of this type. A number have been superheated, but cannot specify individual numbers. Please note the rules as to queries concerning lists of locomotives, dimensions, &c.

[Reply to P. H. V. BANYARD.]

A London and South Western Veteran.

We know of no special feature concerning 4-4-0 express engine No. 474 on this line, except its age. It is one of the few remaining early 4-4-0's of Mr. W. Adam's design, with 6 ft. 7 in. wheels, built by Stephenson and Co. in 1884.

[Reply to "X.Y.Z."]

Railway Year Book Maps.

The three new maps included in the edition of the above book for 1919 are those for the Hull and Barnsley, London, Brighton and South Coast, and Stratford-upon-Avon and Midland Junction Railways.

[Reply to J. S. Ross.]

Works Numbers of Locomotives.

Only certain lines include this information on the number or name plates, and a few others have this stated in the cab on the regulator quadrant, or elsewhere. In other cases this number does not appear anywhere on the engine.

[Reply to R. G. WITT.]

Summit Level of Great Western Railway Main Line via Swindon.

This is situated between mile-posts 70¼ and 71¼, adjacent to Shrivenham Station, and is approximately 220 ft. above Paddington, 115 ft. above Didcot and 320 ft. above Temple Meads Station, Bristol. [Reply to "GRADIENT."]

Light Railways in England.

Gauge of the Weston, Clevedon and Portishead and Knott End Railways is the usual standard. Each has four loco-

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motives. Information of this kind can be obtained from the RAILWAY YEAR BOOK, the 1919 edition of which is now available.

[Reply to "SEXTON BLAKE."]

New 4-6-0 Locomotives, London and South Western Railway.

The 736 class of 6 ft. 6 in. 4-6-0 engines will eventully number 10, Nos. 736–740 being now in service. There is also a new mixed traffic class with 5 ft. 7 in. coupled wheels, Nos. 482–491.

[Reply to "INTERESTED."]

"Sir Sam Fay" Class, Great Central Railway.

There are six of these engines—Nos. 423–8. Please note that this query, though we have replied to it in brief, contravenes the rules as stated at the head of this section. See also reply to "QUERY."

[Reply to R. E. HAMILTON.]

Tunnel Warnings.

In order to give warning to platelayers and others working in tunnels, gongs are frequently installed, these being operated by treadles so as to be actuated by a train entering the tunnel.

[Reply to "SURBITONIAN."]

Locomotive Tractive Effort.

We have answered this question so often that we cannot afford space to do so again. See July, 1918, issue, p. 47; August, 1918, p. 125; also for compound engines, March, 1919, p. 188.

[Reply to CADET P. L. B. WILLS.]

Great Northern Railway "Atlantics."

You are quite right in stating that 4-4-2 engines Nos. 256, 1408 and 1437 of this railway are *not* superheated. Their numbers were inadvertently included in the list recently given in these columns.

[Reply to R. G. WITT.]

Eight-Coupled Shunting Tanks, N.E.R.

These 3-cylinder engines should have been shown as of 4–8–0 type, and are principally employed in the Erimus gravity marshalling yard at Newport, Middlesbrough.

[Further reply to J. APPLETON.]

London, Brighton and South Coast Railway Locomotives.

The old yellow livery for London, Brighton and South Coast Railway passenger locomotives gave place to the present umber about 1906–7.

[Reply to O. J. M.]

Great Central Railway 4-2-2 Engines.

These are all, we believe, mainly employed on Cheshire Lines Committee's trains in the Liverpool and Manchester district.

[Reply to R. E. HAMILTON.]

Westinghouse Fitted Locomotives, Great Western Railway.

Nos. 3390, 3394, 3407, 3429, 3434, and 4138 are fitted with Westinghouse as well as vacuum brake equipment.

[Reply to "G. W. M. R."]

Unité.

This term is used on French lines to indicate load capacity of engines. Thus, "80 unités" shows that it is rated to take 80 ordinary wagons of unit type.

[Reply to C. E. G.]

Halton Tunnel, Great Western and London and North-Western Joint Railway.

Length of this tunnel is 1 mile 160 yards. You should consult the RAILWAY YEAR BOOK for information of this character.

[Reply to J. G. I.]

4-6-0 Locomotives; Caledonian Railway.

The six engines you refer to, originally built for the Highland Railway, are fitted with superheating apparatus and include Walschaert valve gear.

[Reply to H. RISSIK.]

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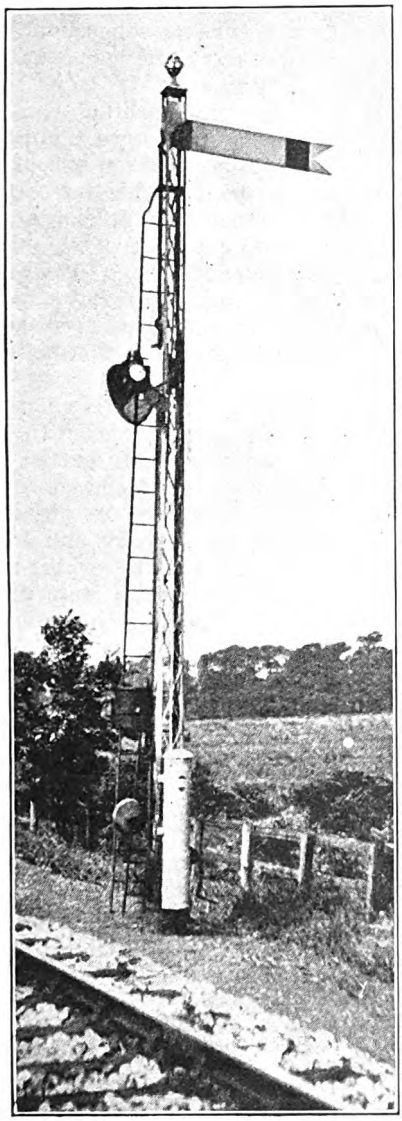
Aga Flashlight Distant Signals for Railways.

DISTANT signals on railways are distinguishable in daylight from other signals by the use of a fish-tailed semaphore; but at night, when a ready means of distinction is even more necessary, the illuminated fish-tail is the only method which has hitherto achieved any considerable use, and that is far from general.



DISTANT SIGNAL, FURNESS RAILWAY. FITTED WITH "AGA" FLASHLIGHT.

The AGA flashlight signal provides a satisfactory solution of the problem. Unlike the ordinary signal, which shows a constant light, it gives off a series of brilliant flashes at regular intervals, and is quickly recognised. It is an adaptation of the AGA system of marine signal lights which has been used for many years for lighthouses, lightships and buoys in many parts of the world with complete success.

Equipment is self-contained, and can be applied to any existing railway signal without interfering in any way with the semaphore action. It includes a cylinder of dissolved acetylene gas, and a special but simple apparatus for displaying a light at frequent and fixed intervals. One cylinder provides illuminant for a known number of weeks or months, and the apparatus requires no attention of any kind during that period. Should fog or darkness come suddenly the flashing light is there and always working.

Experience has shown that the AGA flashlight can be instantly recognised and at a great distance, and it has great penetrating power in mist and fog; its value in this respect as compared with oil or electric light being about five to one.

Much of the time and labour occupied in cleaning and changing lamps is saved, as attention at stated periods, usually every three or four weeks, only is required, and the ordinary duties of lighting and extinguishing are avoided. And although the light is constantly burning, its action is intermittent, and in the aggregate cost of operating comes out less than that of lamps which burn continuously, and much less than that of long-burning signal lamps as ordinarily employed.

The AGA flashlight—which is manufactured by Gas Accumulators, Limited, of Beacon Works, Brentford, Middlesex—has been in use for distant signals for some years on the Furness Railway with complete satisfaction. It is also used with entire success on the Boston and Maine, Norfolk and Western, Missouri Pacific, Chesapeake and Ohio, Atlanta and West Point, and other American railroads, and on a number of railways in Europe.

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Reconstructed Electric Cars:

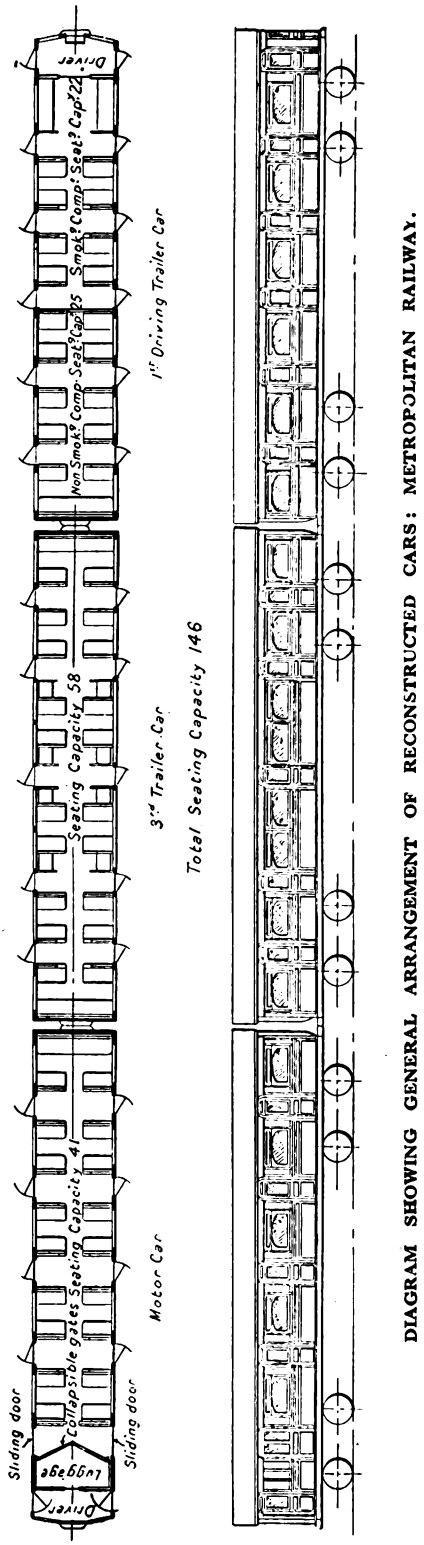

DIAGRAM SHOWING GENERAL ARRANGEMENT OF RECONSTRUCTED CARS: METROPOLITAN RAILWAY.

METROPOLITAN RAILWAY.

TRAFFIC congestion on the London electric and underground lines is fully realised by officers of the railways concerned and constant efforts are being made to alleviate the difficulties. A notable experiment is being made by the Metropolitan Railway in the direction of improving car design to facilitate station working, delays in entraining and detraining being one of the chief factors causing congestion, and at the same time increasing car capacity.

An experimental train is being constructed by the Metropolitan Railway Carriage Wagon and Finance Company, Limited, of Birmingham, from one of the existing six-car trains, the car bodies being entirely renewed. A diagram is reproduced showing the new scheme of internal arrangement. The vestibules at the ends of the cars, at present a source of great congestion, are done away with, and the gangway communication between cars taken out.

Five doors of the type at present in use on ordinary steam trains are fitted to each car, suitably spaced over the car so that crowding at the ends is avoided and equal distribution of passengers is obtained. Seats are placed transversely and longitudinally as shown with full-width seats at each end. On the entire train of six cars the number of seats is in excess of provision in trains having middle doors, though slightly below the older type train with end doors only.

The doors are fitted with patent spring locks and safety catches and so hung that they will close by the momentum of the starting train. Brass hand rails on the seats and screens are provided instead of straps as being more convenient to the standing passengers.

All parts of the car are equally accessible to an exit so that crowding round the exits will be done away with.

It is anticipated that even with a train of this type crowded to its fullest capacity, little more than the normal time will be occupied at stations. This rapidity of handling should largely eliminate overcrowding by adding considerably to the carrying capacity per hour.

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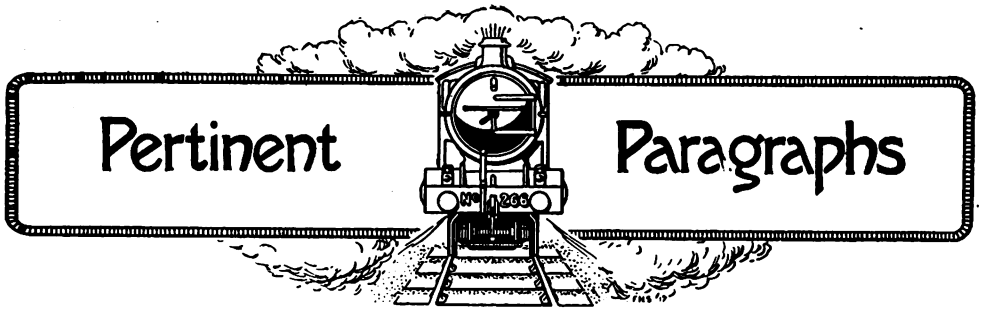

New Shunting Tank Engines: Caledonian Railway.

WE are indebted to Mr. W. Pickersgill, Locomotive Superintendent of the Caledonian Railway, for photograph reproduced as frontispiece this month, and for particulars of a new class of tank locomotives constructed at the St. Rollox Works, Glasgow, in accordance with his design. It is of the 0-6-0 type with outside cylinders, the design incorporating standard Caledonian features. Leading particulars are :—

	Ft.	in.
Cylinders, diameter	0	17
Cylinders, stroke	0	22
Wheels, diameter	4	0
Boiler, length of barrel ..	8	6
,, mean diameter ..	4	3
Firebox, length outside ..	4	9
,, width at bottom, outside	4	0½
Firebox, depth at throat plate	4	6
,, ,, at back plate	4	0
	Sq.	ft.
Heating surfaces, tubes ..	786	
,, ,, firebox ..	74	
,, ,, total ..	860	
,, ,, grate area	14.	25

Maximum tractive force is 18,080 lb. and working pressure 160 lb. per sq. in. A tank capacity of 1,000 gallons is provided and the fuel space accommodates 2 tons of coal. Weight empty is 37 tons 19 cwt. 1 qr., and in working order, 47 tons 15 cwt.

Filling Lavatory Carriage Tanks.

DESCRIPTION last month of Mr. F. J. Hare's "Safety First" arrangement for this purpose, which is being tested by the London and North Western Railway, has aroused considerable interest. Mr. R. H. Whitelegg, now Locomotive Superintendent, Glasgow and South Western Railway, points out that in 1912, when on the London, Tilbury and Southend Railway, he fitted vehicles on very similar lines. Mr. J. F. Tonkin also writes from Swindon pointing out that a similar arrangement formed the subject of the grant of letters patent No. 9620 of 1907 to Messrs Marillier and Pearson, Works Manager and Assistant, respectively, Carriage and Wagon Works, Great Western Railway, Swindon. Mr. Pearson subsequently joined the South Eastern and Chatham Railway as Chief Assistant to the Chief Mechanical Engineer of that company. "From a perusal of the arrangement set forth in the specification of the letters patent referred to, it will be observed that the similarity is very great to that stated to have been patented by Mr. Hare."

Holiday Traffic Regulation on the Lancashire and Yorkshire Railway.

THE system of regulating the issue of tickets to the Blackpool and Southport districts, also from Blackpool, adopted by the Lancashire and Yorkshire Railway during the Easter holidays, has proved an unqualified success. Passengers who desired to travel on Thursday, April 17, were required to obtain their tickets in advance and to travel by a particular train, the number of which was indicated on the ticket. On the return journey from Blackpool, on the production of their rail tickets, passengers were given tickets enabling them to travel by a certain train. Whilst this was really in the nature of an experiment the system worked smoothly, notwithstanding a very large increase in traffic. The innovation has been highly appreciated by all concerned as the distribution of the passengers amongst the whole of the trains on the outward journey on Thursday, April 17, and on the return from noon on Monday. April 21, and all day on Tuesday, April 22, enabled passengers to make the respective journeys in reasonable comfort. Crowding of trains which has previously been associated with the movement of holiday makers has been entirely obviated, as well as the congestion at the stations, which in the past has seriously militated against the expeditious handling of the traffic. Having secured their tickets for the return journey beforehand, under the new system it was only necessary for passengers to arrive

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at the stations ten or fifteen minutes before the time of departure when they were able to join the trains immediately, in marked contrast to the long periods of waiting in previous years. The arrangements made have proved so successful that the system throughout the coming holiday season will no doubt be continued.

Transport on the Western Front.

SIR DOUGLAS HAIG'S last despatch included interesting particulars of transport in relation to work on the Western Front during the period which culminated in the Armistice last November. He states that for the working of the existing railways and for the construction or repair of many miles of track, both normal and narrow gauge, railway troops of every description—operating companies, construction companies, survey and reconnaissance companies, engine crew companies, workshop companies, wagon erecting companies and light railway forward companies—had to be provided. Under the Directorate of Railway Traffic, the Directorate of Construction and the Directorate of Light Railways, these and other technical troops during 1918 built or reconstructed 2,340 miles of broad gauge and 1,348 miles of narrow gauge railway. Throughout the whole period of their operation they guaranteed the smooth and efficient working of the railway system. In the six months May to October, 1918, a weekly average of 1,800 trains were run for British Army traffic, carrying a weekly average load of approximately 400,000 tons, while a further 130,000 tons were carried weekly by our light railways. The number of locomotives imported to deal with this traffic rose from 62 in 1916 to over 1,200 by the end of 1918, while the number of trucks rose from 3,840 to 52,600.

Big Cars.

ARISING out of a "Pertinent Paragraph" under this heading in the March, 1919, RAILWAY MAGAZINE, C.S.S. of Tennessee, writes as follows:—"As H. L. L. invites me, I will quote a few U.S.A. freight rates. These are non-competitive, and are, I think, representative of short distance rates, and include the 25 per cent. advance made in 1918:—

"*Less than car load.*—1st class, groceries, drygoods, &c.: Knoxville to Tellico Plains, 67 miles, 56.5 c. per 100 lb.

"*Car load rates.*—Groceries, &c. Knoxville to Tellico Plains, 35 c. per 100 lb.

"*Coal.*—Coal Creek to Tellico Plains, $1 60 c. per 2,000 lb., 103 miles.

"*Iron Ore*—Tellico Plains to La Follette, $1 per 2,000 lb., 112 miles.

"These rates will enable a comparison to be made with English rates. Long distance car load rates are, of course, much cheaper. 100 lb. is the minimum weight charged on L.C.L., and the minimum is 25 c. After the 100 lb. is reached the charge is proportional, thus 150 lb. dry goods, Knoxville to Tellico Plains, would cost 85 c.

"L.C.L. shipments are loaded after arrival at station by the railway; C.L. shipment by the shipper. Goods are not delivered, that is they are not drayed. No books are kept with patrons of the road.

"There is usually one local freight train a day, each way. Every weekday a car or cars is made up at divisional termini or at large cities and sent over the road. The crew of the local freight unload the consignments at the various stations, and load any goods that may be waiting shipment. Where business justifies it, a car is loaded at the terminus and put in the house track of the way stations. The car is then supposed to be unloaded by the station staff within 24 hours. Usually a town of 1,500 people would have a car loaded directly for it every night. People co-operate to get the benefit of car load rates. Shopkeepers frequently order salt and other commodities in car lots and distribute amongst themselves. In places too small for a coal dealer, it is usual to club together and order a car.

"Service in less than car lots from the nearest loading point is usually very good. Loaded one night and received some time next day. On long distance L.C.L. shipments, I would figure 125-150 miles for every 24 hours, but long distance shipments are, of course, a little uncertain as to time."

Recent Observations on the Northern Railway of France.

A CORRESPONDENT writes: "I have had a number of runs lately on the restored express services of the C.F. du Nord. The booked times of 1¾ hours between Paris and Longueau (78¼ miles) are not kept in practice, 10 to 15 min. being apparently always dropped. This is due partly to the great weight of the trains, which reaches 450 to 500 tons in every case; partly to the bad quality of the coal available (on one occasion we were delayed for 2½ hours at Achiet-le-Grand because in the tender, instead of coal, there was only slag), partly to the restrictions on the reconstructed sections Longueau-Arras-Douai-Lille, which prevent the employment of the 4-6-2 engines on the Lille trains. On the Survillers bank the 4-6-0 5 ft. 6 in. type find it hard to reach even 30 m.p.h., and on down grades there is at present a speed limit of 90 kilos. per hour (= 56 m.), so that lost time cannot, as formerly, be regained. I made a journey recently on the 11 a.m. boat express from

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ESCALATORS AT WATERLOO STATION,
LONDON & SOUTH WESTERN RAILWAY.
View of Escalator from lower level.

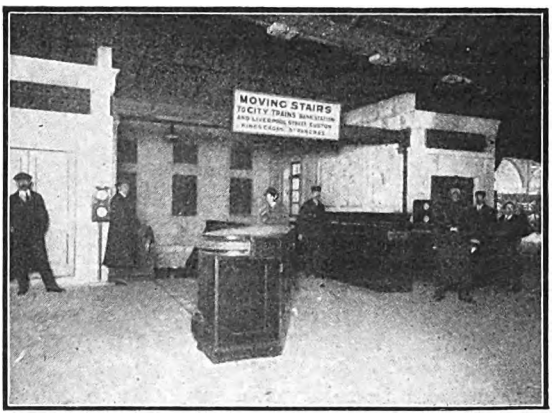
Paris to Boulogne, just now the fastest train on the Continent. The load was 11 corridor-vestibuled coaches, partly German stock, and three small vans. The interesting feature of the run was that near Survillers the driver at my request worked up to 70 m.p.h. for a short distance, and the smooth motion of the incomparable Nord rolling-stock seemed in no way to have diminished from pre-war standards. On the Est and Orleans lines the present booked speeds of the expresses are about 40 m.p.h. with the same stops as formerly, and on the P. L. M. rather less; but on a recent journey to the Riviera my train being late sustained 60 m.p.h. on the level near Valence for many successive miles. But coal difficulties lead to constant breakdowns, and I am told that on the Nord no further acceleration is expected for the present."

Escalators at Waterloo, London and South Western Railway.

LAST month we referred briefly to the installation of escalators at Waterloo to connect the Waterloo and City station with the great terminus above, and we are now able to reproduce illustrations thereof, and to give further particulars. For some months a portion of the concourse between Platforms 15 and 16 had been boarded off, and although it was generally assumed that some engineering work was in progress few were aware of the real nature of the undertaking, and passengers arriving at Waterloo on April 9 were surprised to find that the boarding had been removed and a fine escalator was in working, providing an easier and more direct access between the main station level and the subway for the City Railway. The height of the escalator is 26 ft. All the constructional work in connection with these escalators and the approaches thereto has been carried out by the company's own engineering staff. To provide the well for the escalators a portion of the arching upon which the station is built had to be removed and steel girders encased with concrete provided to take the thrust of the remaining arches. Regular passengers to and from the City, for whom the facility was principally installed, greatly appreciate the convenience and avail themselves of it in considerable numbers. As a little while ago the long slope at the Bank end of the City Tube was improved considerably by the introduction of alternate short flights of steps and level places, this direct tube route between Waterloo and the City is becoming extremely popular with City business people and passengers to Euston, King's Cross, Liverpool Street and other stations on the City and South London and Central London Railways, with which connection is made at the Bank Station.

Locomotive Working on the London, Brighton and South Coast Railway.

LETTERS concerning various phases of this subject present features of interest and may be grouped together. Mr. K. Paton mentions that of the famous "Gladstone" class, described by Mr. Ahrons in his Brighton series of articles just completed, Nos. 181, 199 and 214 are now stationed at Brighton, Nos. 175, 187, 197 and 198 at Tunbridge Wells and Nos. 190 and 194 at New Cross. The first three sometimes work the 5.10 p.m. Hastings to London Bridge train and after



ESCALATORS AT WATERLOO STATION,
LONDON & SOUTH WESTERN RAILWAY.
View of Escalator from Concourse.

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the addition of the Eastbourne-Victoria portion at Polegate this frequently loads up to = 23 vehicles (Brighton reckoning, 1 bogie counts as = 2), though the load limit for these engines is = 16. Mr. Paton also mentions that one of the Tunbridge Wells engines is generally to be seen on the 4.5 p.m. London Bridge-Eastbourne and Hastings train. He also points out that since October, 1917, return working of the 8.23 a.m. Eastbourne-London Bridge express has been the same as mentioned by Mr. Ahrons, viz., 5.5. p.m. *ex* London Bridge. Previously a New Cross engine had worked the latter train.

MR. W. L. KENNING mentions that 4-6-4 tank engines Nos. 327 and 328 work in turn with "Atlantics," operating both Brighton and Portsmouth trains, including principal expresses on the former route, and on Sundays taking turns on the "Southern Belle" expresses. He also mentions an unusual duty taken by a Brighton 4-4-0 engine: 6.23 a.m. Brighton to Chichester; 8.28 a.m. Chichester to Victoria (102 miles in 5½ hours with 43 min. interval only); and 4.50 p.m. Victoria to Brighton via Uckfield.

Engine Failures.

THIS important subject was discussed in various phases by the Leeds centre of the Institution of Locomotive Engineers at a meeting held on Tuesday, March 25, 1919, in the Philosophical Hall, Park Row, Leeds. The first Paper was given by Mr. Groom, of Doncaster, whose subject was "Tube Troubles," considered under three headings: Leaking Tubes, Broken and Pitted Tubes and Collapsed Tubes. Taking leaking tubes, he stated that one of the causes of this trouble was cold air coming through the fire, causing sudden contraction of the tube plate, and was mainly due to bad firing, though the indifferent quality of coal now being used might have something to do with it. Another source of trouble was unsatisfactory means of securing the tubes in the firebox tube plate. Mr. Groom went very fully into the practice in vogue on the Great Northern Railway, enumerating the difficulties they had experienced and the various remedies they had adopted. Details were given of the results of trials with all-steel tubes, and with steel tubes having copper ends. Elongation of tube holes was bound to occur so long as the present practice of expanding tubes into tube plates continues, and boilers being washed out too hot also was the cause of a good deal of the trouble experienced by locomotive engineers with their engine tubes. Pitted tubes had been found on engines running in districts where the water is soft and deposits very little lime on the tubes. This is a trouble which does not appear where scale is deposited freely on the tubes. Failures from collapsed tubes are mainly due to heavy deposits of scale and dirt being allowed to accumulate between the tubes, with the result that the water in the boiler cannot get near enough to prevent them getting red hot and collapsing inwards with the pressure. The obvious remedy, of course, is constant examination and frequent cleaning out of the boilers. Mr. Groom detailed methods of making ferrules and in conclusion expressed the opinion that tube failures will be greatly reduced if it is found that steel fireboxes eventually are a success, and the steel tubes can be welded into the tube plate, though as a rule when one trouble is remedied another comes along, so there may be trouble with the tube plates then.

In the discussion the chairman, Mr. J. W. Kidd, mentioned the difficulty of keeping steel tubes tight in copper boxes, and gave particulars of a patent tube which had been very successful. Mr. Hamer raised the question of ferruling steel tubes, in reply to which Mr. Groom stated that only steel tubes with copper ends were ferruled, the steel tubes themselves being beaded.

He did not consider that the particular type of tube plate had anything to do with the matter, and in his opinion the whole trouble was caused by the expansion and contraction of the tubes not being at the same rate as the expansion and contraction of the boiler, and the steel tube does not get the same grip in the tube that a copper tube does.

Mr. Mitchinson opened a discussion on this subject and gave details of failures which had occurred in the past, and various methods adopted to overcome the difficulties.

Bearings and Lubrication.

Mr. Hamer dealt exhaustively with the question of over-heated bearings, the causes of which he divided into the following heads: (*a*) Overloading in a vertical direction; (*b*) Overloading in a horizontal direction; (*c*) Uneven distribution of lubricant; and (*d*) Presence of foreign matter and water. He stated that overloading a bearing causes lubricant to be unable to keep the surfaces apart, so that in design a moderate pressure per square in. should be given, and if possible some latitude for emergencies. Spring failures as a cause of vertical overloading, and axlebox seizing in the hornblock, were analysed, and the question of the wearing of journals was gone into. Various points for consideration were given by the speaker with a view to modifying or remedying these matters, and he then went on to deal with the question of overloading in a horizontal direction

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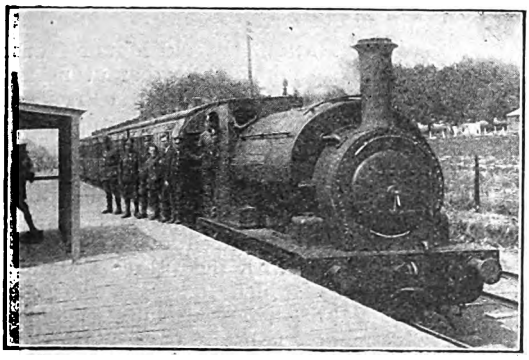


FOVANT MILITARY RAILWAY. TRAIN AT FOVANT STATION.

which, he stated, caused intensity of pressure in the fillets of the journal. Another cause of trouble, in Mr. Hamer's opinion, is that the spring pillars from overhung springs wear into the top of the box and constrain it in a certain direction.

Under the heading of "Uneven distribution of lubricant" Mr. Hamer gave various methods for eliminating this trouble, and particulars of the best kinds of packing to use. Dealing with the presence of foreign matter and water in locomotive bearings, he specified the causes and suggested that to overcome this trouble auxiliary oil boxes might be fitted on the frame and pipes led from them to the axle-box, the oil being syphoned over from the well of the box by means of worsted trimmings. Mr. Kidd opened a discussion on Mechanical Lubricators to axle-boxes, and the correct position of introducing lubricant to a locomotive axle-box.

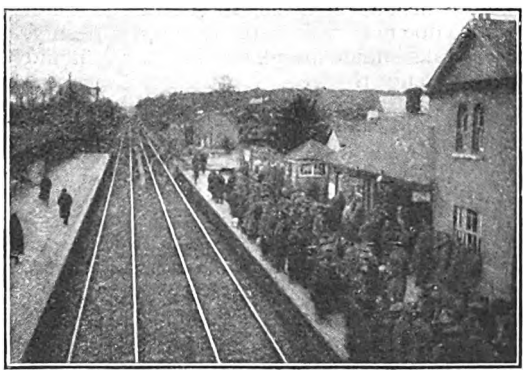
The Fovant Military Railway.

THIS was constructed by the military authorities and opened on October 15, 1915, to connect the camp at Fovant, which has been principally used for Australian troops, with the London and South Western Railway Salisbury-Exeter main line at Dinton. It is a single line, about 2½ miles in length, sharply curved in places and with gradients as steep as 1 in 35. There are no fixed signals, and traffic is worked on the staff and ticket system by railway military staff. At Dinton the Fovant Railway platform adjoins the main line, and exchange connections are provided for through traffic. The line is worked by small engines suited to it. At Fovant there is a single platform with booking office. More recently the camp has been used as a demobilisation centre, and the volume of traffic has necessitated a London and South Western Railway staff there.

Railway Wagons for the Carriage of Perishable Goods.

APPOINTED by the Department of Scientific and Industrial Research, a Sub-Committee of the Food Investigation Board has issued an interim report on this subject dealing particularly with refrigerator cars and barges. The Sub-Committee comprised the following gentlemen:—Mr. A. T. Woods, M.I.N.A., M.I.Mech.E. (Chairman), Mr. R. Balfour, Mr. H. N. Gresley, M.Inst.C.E., M.I.Mech.E. (Locomotive Engineer, Great Northern Railway), Professor C. H. Lees, F.R.S., Mr. J. T. Milton, Mr. W. B. Statham, Mr. J. Thom and Sir J. A. Ewing, K.C.B., LL.D., F.R.S., M.I.C.E. (Chairman of the Main Committee, Engineering). Attention was confined to railway cars, leaving barges for future study, the former being also regarded as of primary importance at present. It was further limited to short vehicles as used on British railways.

Four representative refrigerator wagons from different railways and a fruit car were used for investigation. All had serious defects, doors not being air-tight for various reasons, while numerous bolts and iron fittings passing through the insulation allowed of considerable conduction of heat. A number of tests with thermometer tubes and thermograph appliances were conducted, in conjunction with atmospheric and other observations, quantities of ice and salt used being also noted. In view of the conditions applying during transit, due to breezes occasioned by movement, and the fact that loads are usually refrigerated before being placed in the vans, behaviour was also noted during runs between Aber-



DEMOBILISED MEN FROM FOVANT AWAITING MAIN LINE TRAINS AT DINTON, LONDON & SOUTH WESTERN RAILWAY.

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deen and London, London and Hull, and London and Liverpool.

Main general conclusions from all the experiments are stated as follows :—

1. Insulation of none of the cars is so effective as is desirable, and improvement can be made both in existing cars and especially in cars which have to be constructed in future.

2. Deficiency in air-tightness of cars is a serious matter, especially as regards the fittings of the doors. This should be remedied in existing cars and proper provision for air-tightness should be made in all those which will be constructed in future.

3. Provision of ice-tanks in the cars may be considered large enough, but the practice of icing them is altogether inefficient, and steps should be taken to ensure improvements on these points.

Suggestions regarding Existing and New Wagons.

Discussing these in detail, it is recognised that considerable modifications in existing wagons cannot be entertained, but in view of the general insufficiency of insulation it is recommended that air spaces should be filled with non-conducting material (this is already done by one railway). It is also suggested that bolt heads and nuts should be insulated ; ventilating louvers fitted with air-tight insulated covers ; doors carefully overhauled to secure air-tightness and regularly examined for permanent efficiency in this respect ; leakage of air and of brine require attention ; air circulation, to obtain equable cooling effect, is recommended ; and more suitable proportions of ice and salt should be determined by investigation.

For new cars greater thickness of insulation is recommended, and the design of floor, allowing for convenience of washing out and other conditions, requires careful consideration. Framework should be structurally completed before insulation is fitted, so that through bolts do not penetrate the inner lining. Ice tanks should be placed high and should not extend the full depth of the wagon. Portable receivers, containing highly refrigerated calcium brine, placed in the upper parts of the wagons, are suggested. Precooling before loading is recommended during certain seasons of the year. Suggestions are also made for construction and fitting of doors, and it is pointed out that load capacity is usually very much below cubic capacity, and in new design the former might be appreciably increased. Final proposals are that outer false roofs and sides for sun protection, with air circulation between, are advantageous ; and wagons should be painted white, or at least white-washed outside during the summer months.

Sulgrave Manor.

SULGRAVE MANOR, the old Manor House near Morton Pinkney, Northamptonshire, where George Washington, the first President of the United States, was born, is an historic treasure which Britons and Americans alike may fitly prize. It was built in the reign of Henry VIII by George Washington's ancestor, Lawrence Washington, Mayor of Northampton, who placed over the porch the family arms, with their three stars and two bars, out of which, it is said, the American national flag was eventually fashioned. The old manor house was purchased in 1914, just before the war broke out, by a British committee, to commemorate 100 years of peace between the English-speaking peoples. The *Daily Telegraph* is making a special appeal for funds necessary not only to provide for the restoration of the fabric, but also for the equipment and maintenance of the institution as a great Anglo-American meeting-place, and as a tangible symbol and pledge of the historic unity of the two countries.

Morton Pinkney, the station for Sulgrave Manor, which is open to the public, is located on the Stratford-upon-Avon and Midland Junction Railway, between Woodford and Blisworth. Good services from and to Marylebone are given via Woodford, and from and to Euston via Blisworth, S.M.J. trains running in connection with main-line express trains on both routes. Visitors are recommended to combine an inspection of Sulgrave Manor with an excursion to Stratford-on-Avon, for Shakespeare's birthplace, and Harvard House, the home of the founder of the famous American University. On receipt of a postcard, Mr. A. E. Diggins, General Manager, S.M.J. Railway, Stratford-on-Avon, will furnish full particulars of facilities for visiting Sulgrave Manor and Stratford on-Avon.

The Thames Tunnel.

FROM Bath Mr. L. B. Hewitt writes :— " Mr. Hopwood's account of the East London Railway, in the April issue of the RAILWAY MAGAZINE, reminds me that I possess a folding coloured cardboard model of the Thames Tunnel in its original state. When fully extended the model is 20 in. long, and an adaptation of the stereoscopic principle gives a good idea of the length of the bore. The model, which dates from the 'fifties,' was sold by Azulay, a printer, who had a stall in the tunnel itself. Inside the front cover of the model is a printed account of the undertaking. The following details may supplement Mr. Hopwood's particulars. Brunel, we are told, began by making preparations for a shaft 50 ft. in diameter,

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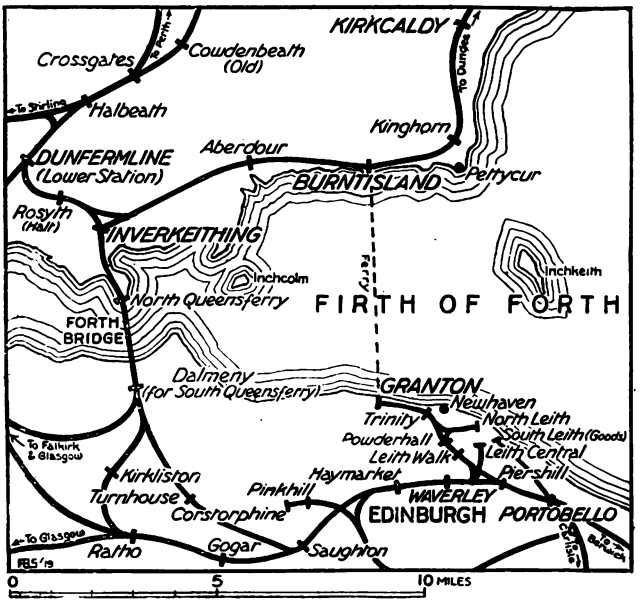
42 ft. high, and 3 ft. in thickness, which was sunk *en masse* into the ground. The work was effected by means of a powerful apparatus of iron, designated a 'shield,' which consisted of 12 great frames lying close to each other, each frame about 22 ft. high and about 3 ft. wide, and each with three divisions, or 86 cells in all. By April 30, 1827, the tunnel had advanced 400 ft. under the river. These 400 ft. were excavated, and the double archways substantially completed with brickwork in 10 months and a half. On May 18, 1827, and again in the following January, the river broke in and filled the tunnel in less than 10 minutes; and the rush of water brought with it a current of air that extinguished the lights. For some distance Mr. Brunel, junior (the Brunel of Great Western fame) struggled in darkness, and a rush of water carried him up the shaft. The novelty of passing on foot beneath the Thames proved so attractive that in the first fortnight which elapsed after the opening upwards of 200,000 passed through, and by July, 1851, the number of visitors was 10,000,000. Counters were placed between the two archways at which were sold views and models of the tunnel, and various fancy articles. There were also tea and coffee stalls, which were open all night. The Wapping shaft was occupied by a splendid diorama and a pianoforte, played by a small steam engine. The 'Saloon of Arts,' for taking portraits, was placed in the Rotherhithe shaft. 'The brilliancy of the numerous gas lights (Leslie's patent] burners), the great number of visitors (48,000 per week), and the other attractions, soon,' says this account, 'cause the beholders of this marvel of art to forget they are under the Thames.' The anniversary of the opening of the tunnel was commemorated each year by a fancy fair. The charge for admission was a penny for each person. As a further attraction, fresco paintings were introduced into the panels of the shafts at Rotherhithe and Wapping."



MAP SHOWING ROUTE OF GRANTON-BURNTISLAND TRAIN FERRY, NORTH BRITISH RAILWAY.

The Granton-Burntisland Ferry: North British Railway.

OPENED on September 15, 1844, it was not until December 30, 1916, that the first real break in the service occurred since its inauguration, owing to sailings being temporarily suspended from the last-mentioned date to meet Admiralty requirements. This ferry supplanted the former Fife and Midlothian Ferries between Newhaven and Kinghorn and Pettycur which ran in connection with the old stage coach services between the North and South of Scotland.

Prior to the opening of the Forth Bridge the Granton Ferry was of considerable importance, as it was then the only independent means of communication which the North British Railway possessed between districts north and south of the Forth. It also accommodated East Coast route through traffic between England and the North of Scotland, and many were the stirring and adventurous times experienced in coping with the heavy demands made upon its resources. At that time the service was carried on by a fleet of five passenger and four goods vessels. Goods traffic was worked across the ferry without break of bulk, loaded wagons being run by means of specially constructed movable cradles direct on to the boats, which were provided with rails. In a busy month as many as 17,182 loaded wagons were transported across the 5 miles stretch of water which separates the Edinburgh and Fifeshire shores. In the case of passenger traffic, although a fine type of vessel was all along maintained on the service, the passage was made often under very trying con-

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ditions. The Firth of Forth is subject to storms of considerable severity, and not only in pre-railway days, but also in later times passengers have been only too glad to put up at the hotels on either side instead of crossing immediately. The ferry came into the possession of the North British Railway under an Act of Parliament passed in 1862, and it is now owned by them.

The great and busy days of the ferry ended with the opening in 1890 of the Forth Bridge, when through traffic was diverted to the rail route. Since that time the service has been maintained by the steamer *William Muir*, one of the best vessels of the original fleet. This is a substantial paddle boat of 364 tons gross, built with a special lower deck for the reception of all kinds of vehicular ferry traffic, and it has a speed of 12 knots per hour. The vessel has for some time past been employed on Government service. It has, however, been returned, and is being reconditioned. As the Admiralty in the beginning of March issued an order sanctioning the resumption of the service, the ferry will very shortly be re-opened.

A Metropolitan Railway War Memorial.

OFFICIALS and staff of the Metropolitan Railway have decided, with the approval of the board of directors, to raise a fund for the establishment of a memorial to the men from their service who gave their lives in the war. After careful consideration on the part of a committee representative of the whole of the company's men, a threefold scheme has been resolved upon as under:

1. To erect a permanent tablet on the Baker Street Station bearing the names of the Metropolitan Railway men who fell in the war.

2. To lay out and equip an athletic ground for the use of the staff. The board of the company has generously offered to place at the disposal of the men for this purpose 13 acres of land at Wembley, already partly arranged as a sports ground.

3. To build a club or institute, where members of the staff may meet for social, educational and recreative purposes.

If the foregoing objects are to be attained, the amount of the fund will require to be a considerable one, and while the members of the staff are contributing amongst themselves to the full extent of their powers, the committee confidently rely for substantial assistance upon friends of the company, shareholders, regular travellers and others who have on previous occasions shown their interest in the welfare of railwaymen. During the war about 1,200 of the staff of the railway in all grades joined H.M. Forces, and of these 127 gave their lives for the Empire. Of the others many have returned broken and incapacitated, and it is to commemorate the sacrifice of these men as well as to perpetuate the memory of those who died, that the memorial is being raised. A concert was given by Mr. George Robey at the Palladium on Sunday, May 11, in aid of the funds required by the staff for the carrying out of the work.

The London Traffic Problem.

THAT this problem is urgent is generally admitted. At the same time, it is difficult to indicate means whereby the situation can be substantially improved, until developments contemplated but deferred during the war period can be completed, and new works undertaken. In this connection a statement prepared for submission, on May 5, 1919, to the London Traffic Conference of London Members of Parliament, on behalf of the Metropolitan District, London Electric, Central London, and City and South London Railways, and the London General Omnibus Company, Ltd., is of special interest. Notwithstanding reductions in working material there was an increase of 92,000,000 in the numbers of passengers carried in 1918 as compared with the 1914 total; but in addition, about 60,000,000 were transferred from the omnibuses to the railways, so that the rail increase is 152,000,000, or about 67 per cent. In 1918 this group of companies carried altogether over 1,032,000,000 passengers, or more than half of the whole local passenger traffic of London. During the previous five years the traffic increase was 30,000,000, or 12 per cent. Yet this was a period of development and extension, while the war period was one of limitation and standstill due wholly to war causes. Congestion of traffic is the consequence, but is not confined to the Underground agencies; it also applies to the main-line railways and to the tramways in a lesser degree. An important factor is, however, the abnormal character of so much of the traffic, and this still applies to a considerable extent.

Shortage of Cars the crux of the situation.

Various aspects are discussed in detail, but as they have received attention in the general press there is no need to traverse the same ground, especially in view of the limited space now available. A few items must, however, be referred to. Comparing 1913 with 1919, taking a typical rush hour, the "Bakerloo" now operates four more trains, and the City and South London one more train; and only on the Central London and District Lines is there a decrease in

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numbers of cars passing, even with fewer trains, for good and sufficient reasons. On all lines the great trouble is that station time cannot be kept down to a practicable minimum, and every few seconds delay becomes cumulative. This can be eased somewhat by reducing numbers of trains and increasing numbers of cars, so that the real crux of the problem is rolling stock. Yet it has been impossible to obtain new cars, and the principal development in underground traffic which comes into the war period—the through electric trains to Watford—actually reduced the numbers of cars available for London traffic, as the joint stock cars intended for this service were not available. This order was for 60 cars (still undelivered). The District is in the market for 100 cars, the London Electric demands an additional 162 cars, to allow of its being worked to maximum capacity; the Central London requires the return of cars used on other services; and the City and South London wants an entirely new outfit of 180 cars of modern design. There are also alterations and improvements affecting the lines and stations, including the completion of new lines already partially made, and these must take precedence of new schemes. Estimated cost of urgent work is estimated at £3,650,000. It is pointed out that increased costs render existing capital of the companies inadequate; while the fact that many existing lines cost £1,000,000 per mile originally, entails that extensive programmes cannot be entertained lightly.

On the omnibus side there are now 2,062 vehicles working daily, as compared with 2,474 in 1913. Even the former figure is a considerable increase upon the average of 1,796 in 1917 and 1918. The shortage is due to the supply of buses and staff for war purposes.

The statement is, in fact, an effective answer to the criticisms so freely advanced. It is realised that the public has a grievance, but it arises from causes over which the transport companies have no control or responsibility; it is accentuated by the fact that they are adversely affected by the factors which have created the present abnormal situation, seeing that the whole of these transport agencies represent private enterprise and have to face all the financial difficulties on the same basis as a private trader or manufacturer (only the Metropolitan District comes under the Government guarantee); and to remedy the problem of London traffic working requires time and patience until the necessary improvement works can be carried out, and additional rolling stock obtained.

The Cologne Express.

In addition to the special traffic in France and Belgium resulting from demobilisation and the carriage of surplus military stores, &c., the needs of the Army of Occupation have called many special transport facilities into being. Perhaps the most interesting of these is the "Cologne Express," which runs daily in each direction between Cologne and Boulogne, via Aix-la-Chapelle, Herbesthal, Pepinster, Liége, Namur, Charleroi, Mons, Blanc-Misseron, Arras, and Etaples. This was referred to in the March RAILWAY MAGAZINE, on the basis of arrangements in force in December last. The following particulars are much later. Speed is inevitably lower than that of the standard pre-war expresses over the same route, but it is immeasurably superior to any facilities previously obtaining in the Western war area. English rolling stock is used, and set trains are employed, each passenger vehicle in a set having the same distinctive name, such as *Adriatic*, painted on it. Make-up fluctuates from 15 to 17 coaches. A specimen composition was: 13 London and South Western Railway eight-wheel bogie ambulance coaches, a London, Brighton and South Coast eight-wheeled mail van, and a Great Eastern eight-wheeled mail van. This train handles mail matter for our Armies in France and Belgium, as well as on the Rhine, for which purpose a large and very efficient Army Post Office is maintained at the Boulogne Harbour Station.

The running of the Cologne Express is under the control of the British military authorities. Each train is in charge of an officer, and the Army also provides the whole of the train staff. Special paper tickets are issued for use on this train, "available between any two stations" *en route*. These tickets are not valid unless they bear the office stamp of either Army, Corps, or Division Headquarters; Headquarters Lines of Communications; or Base Commandant, Railway Transport Officer, or Quartermaster-General; and the number of the passenger's coach and berth is entered on the ticket. The train being a "limited" one, no tickets are supposed to be issued for any date in excess of the allotment for that date.

The down train leaves Boulogne at 10.14 p.m., and is due at Cologne at 5 p.m. next day. In the opposite direction it leaves Cologne at 9.50 a.m. and is due at Boulogne 7.30 a.m. the following day.

Three-Cylinder Locomotives.

SEVERAL references have been made lately in these pages to Mr. Gresley's three-cylinder 2-8-0 engine and its work on the Great Northern Railway, and in this connection

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2nd Lieut. Voelcker, Royal Engineers, mentions that he recently had an opportunity of examining a German 4-6-0 locomotive handed over to the French Government in which also two sets of valve gear were used to actuate three valves. This engine was built in 1914. Valve spindles of the outside cylinders operated rocker shafts of equal length, the inner ends of which were connected to a short link to the centre of which was attached the inside valve spindle. The rockers were placed to the rear of the cylinders and before the leading coupled wheels.

Fallen Railwaymen.

During the war, no fewer than 186,475 men in railway employment in the British Isles joined the Colours, and of these, 18,957 fell in action, or died from wounds. This is a sad but noble record—a record of which the railway industry may well be proud, however much such justifiable pride may be subdued by sorrow.

Memorial services for railwaymen who have made the supreme sacrifice were held in the Cathedral Churches at Birmingham, Bristol and Llandaff, at 2.30 p.m. on Wednesday, May 14, concurrently with a great service at St. Paul's Cathedral.

His Majesty the King, as well as Queen Alexandra and Princess Victoria, joined in the solemn Service of Commemoration at St. Paul's. Of the congregation of 4,000 people, nearly 3,500 were relatives of the men who have fallen. Some had travelled from Scotland, and others from Ireland, but mostly they came from English shires and counties. Railway inspectors and guards in uniform acted as sidesmen, and to each person attending the service was handed a souvenir order of service, inscribed "In memory of the railwaymen of Great Britain and Ireland who have died in the service of their country during the war, 1914–1918." Inset was a black-bordered sheet, on which was printed :—

> "In addition to those employees who have fallen whilst serving in His Majesty's Forces, the Great Eastern Railway records the name of Captain Charles Algernon Fryatt, who was foully murdered by the Germans after the capture of his ship, the S.S. *Brussels*."

Before the service, a fine orchestra of about 150, drawn from various railways, augmented by drummers of the Grenadier Guards, and conducted by Colonel W. Johnson Galloway, a director of the Great Eastern Railway, played a selection of suitable music. Women instrumentalists were included—a recognition of the work of their sex upon our railways during the war.

The King, Queen Alexandra, and Princess Victoria were received at the Cathedral entrance by the Earl of Bessborough (chairman) and Viscount Churchill (deputy-chairman) of the Railway Companies' Association.

In the course of the service, after the Dean of St. Paul's had read the lesson, came the memorial for the dead—

> "Let us remember with thanksgiving, and with all honour before God and men, the railwaymen of Great Britain and Ireland who have died giving their lives in the service of their country."

The preacher was the eloquent Bishop of Peterborough. For his text he took the words, "To guide our feet into the way of peace."

"That," he said, "was what their brothers fought and died for, to make a permanent way of peace—a way which should be built on the only foundation which could make it permanent—righteousness, justice, and fellowship among men. They were railwaymen —servants of the way. There were 186,000 and more who stood at attention when the call came. For their services, ready and resolute, a grateful country recorded its thanks that day. From all quarters of the great railway world they came—from office and workshop, from footplate and signal-box, from manager's office and the platelayers' cabin. Guards there were whose business it was to protect their travellers from danger. They went to guard the commonwealth in its hour of peril. Porters, bearers of other people's burdens, took upon themselves the burden of the commonwealth, and right nobly they bore it to the end. A permanent way for civilisation had to be made, and it was now for us to carry it forward."

The "Last Post" and the Reveille were sounded by the drummers of the Grenadier Guards in the Whispering Gallery, and the National Anthem was played at the conclusion of the service.

Among those attending the service were the Lord Mayor and Sheriffs, the chairmen of the leading English railways, while Colonial railways were largely represented. There were also present the London representatives of the railways of Japan, Belgium, Italy and France, officers of the National Union of Railwaymen, of the Associated Society of Locomotive Engineers and Firemen, Mr. A. G. Walkden and other officials of the Railway Clerks' Association.

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WHAT THE RAILWAYS ARE DOING.

MR. JAMES EDWARD ANDERSON, who has been appointed Deputy Chief Mechanical Engineer, Midland Railway, succeeded Mr. J. W. Smith as Chief Departmental Draughtsman in July, 1906, and had previously been First Assistant in the Locomotive Drawing Office for three years. He was appointed Works Assistant in August, 1913. Mr. Anderson served his apprenticeship with the Great North of Scotland Railway, and afterwards held appointments with Sharp, Stewart and Co., and Dubs and Co. (now amalgamated under the title of the North British Locomotive Company). He also served with the Glasgow and South Western Railway, and Robert Stephenson and Co.

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DIRECTORS of the Great Western Railway have authorised the following appointments:—Mr. C. B. Collett, Works Manager, Swindon, to be Deputy Chief Mechanical Engineer; Mr. F. C. A. Coventry, Assistant to the Superintendent of the Line, Paddington, to be Assistant Superintendent of the Line; Mr. E. C. Simpkins, Chief Clerk to Superintendent of the Line, Paddington, to be Indoor Assistant to the Superintendent of the Line; Mr. H. J. Rule, head of the Time-Table and Passenger Train Running Section of the Superintendent of the Line's Office, appointed Chief Clerk to the Superintendent of the Line in succession to Mr. Simpkins; Mr. W. Herne succeeds Mr. Rule as head of the Time-table and Passenger Train Running Section of the office of the Superintendent of the Line; Mr. J. W. Lovejoy appointed Assistant District Goods Manager, London; Mr. O. J. White, General Manager's Office, appointed Chief Clerk and Assistant to the District Goods Manager, London.

MR. J. E. ANDERSON
Deputy Chief Mechanical Engineer, Midland Railway.

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SIR SAM FAY, Director-General of Movements and Railways, and a member of the Army Council, has retired from that post, as referred to in greater detail on another page, and is resuming his duties as General Manager, Great Central Railway. Sir Sam Fay tendered his resignation last February, but at the request of the Secretary of State for War he has remained at the War Office until now. The post of Director General of Transportation Services was first established in November, 1916, when Sir Eric Geddes became Director General of Military Railways, in addition to his duties in France; Sir Guy Granet acted as his deputy in London. In January, 1917, Sir Guy took over the position under the title of Director General of Movements and Railways, and Sir Sam Fay was, at the same time, appointed Director of Movements. Mr. Oliver Bury, Director of Inland Waterways and Docks, late General Manager, Great Northern Railway, also gives up his appointment. Sir George McLaren Brown, European Manager, Canadian Pacific Railway, Assistant Director General, has also left.

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SEVERAL new appointments are announced by the Great Eastern Railway, as follows :—Mr. A. P. Parker, Assistant to General Manager, from April 3rd ; Mr. John Miller, Chief Civil Engineer, from March 6th ; Mr. E. L. Hawkins, Chief Assistant to Mr. Miller ; Mr. E. A. Wilson, Divisional Civil Engineer, Southern Division ; and Mr. C. B. Smith, Divisional Civil Engineer, Eastern Division, from April 3rd.

* * *

THE Prime Minister's list of honours, publication of which was deferred at the New Year, includes the following :—*Baronet* —Mr. Davison Dalziel, Chairman of the Pullman Car Company, Ltd., and director of the Wagon-lits Company (International Sleeping Car Company). *Knight Commander —Order of the Bath.*—Mr. Robert F. Dunnell, Secretary and Solicitor, North Eastern Railway. Has rendered valuable public service to the Admiralty and also at the Demobilisation Department. *Knight.*—Lieut.-Colonel Francis Towle, C.B.E., Joint Manager, Midland Railway Hotels and Refreshment Department. Public services as Chairman of the Board of Management of the Navy and Army Canteen Board.

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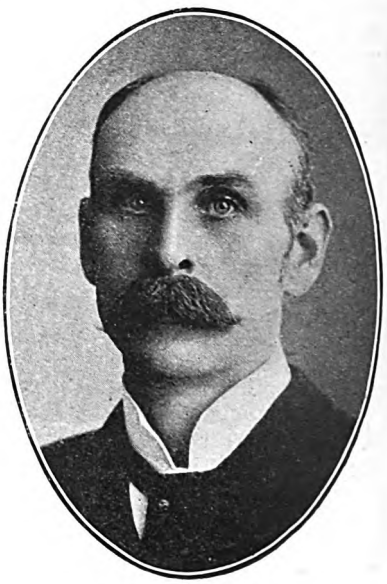
MR. ROBERT WHYTE REID, the new Carriage and Wagon Superintendent, Midland Railway, entered the company's service as Works Assistant in 1909, and was appointed Works Manager in April, 1916, in succession to Mr. Thomas James, retired. He was appointed Assistant Carriage and Wagon Superintendent during the same year, in succession to Mr. H. R. Haigh, deceased.

* * *

MR. D. BAIN, who has retired from the position of Carriage and Wagon Superintendent, Midland Railway, commenced his career as a joiner and wheelwright in the North of Scotland, where he served for two years. He was then apprenticed to Neilson and Co., of Hyde Park Locomotive Works, remaining afterwards with the firm for three years as draughtsman, until appointed leading locomotive draughtsman with the North Eastern Railway at their Gateshead Works. In 1887 he was appointed Works Manager at the Carriage and Wagon Works, York. On the retirement of the late Mr. Elliott, Mr. Bain was appointed to take charge of the Carriage and Wagon Department under Mr. Worsdell, and occupied this position until he accepted the invitation of the Midland Railway to take charge of their carriage and wagon department in 1901. Several years ago Mr. Bain was placed in charge of the designs and specifications for private owners' wagons, and the work has been carried out at Derby under his

MR. R. W. REID,
Carriage and Wagon Superintendent, Midland Railway.



MR. DAVID BAIN
Carriage and Wagon Superintendent, Midland Railway, 1901-19.

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supervision. In June, 1915, Mr. Bain was asked by Sir Eric Geddes to act under him as a Director of Supply, and he served in this capacity for Sir Eric while the latter was at the Ministry of Munitions. Later he was appointed a Controller under the title of "Controller of Timber Supplies," and which included the supply of horse-drawn transport vehicles, timber and packages. In connection with the two latter supplies it was found necessary to take over under the Defence of the Realm Act, 30 factories, and Mr. Bain was directly responsible for the administration of these in addition to the other work of supply.

* * *

NEW appointments have been made by the board of directors of the Cambrian Railways as follows:—Mr. James Williamson, Chief Assistant to the Engineer, to be Assistant Engineer; Mr. E. Colclough, Works Assistant, to be Works Manager, Locomotive Department; Mr. H. Warwick to be Acting Superintendent of the Line.

* * *

MR. E. T. BARREL, appointed Chief of Police, North Eastern Railway, in succession to Brigadier-General W. T. F. Horwood, C.B., D.S.O., has been Acting Chief since the outbreak of war, during the absence, on military service, of General Horwood. Mr. Barrel has been in the North Eastern service since 1882, when he started as junior clerk in the department of which he now becomes the head.

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MR. JOHN ARTHUR RANSOME MARRIOTT, M.P., has been appointed a Director of the Great Northern Railway in the place of the Rt. Hon. Viscount Peel, resigned.

* * *

REAR-ADMIRAL SIR REGINALD HALL, M.P., has been elected a director of the Great Eastern Railway Company, *vice* Viscount Knollys, resigned.

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MR. R. H. CARR has been appointed Claims Assistant to the Chief Goods Manager, Midland Railway.

* * *

MR. WILLIAM WILLIAMS, Stationmaster of the London and North Western Railway station at Wigan since 1907, and who was previously for seven years Night Stationmaster at Crewe, has retired on pension after 45 years' service with the company. This station was dealt with in the RAILWAY MAGAZINE for February, 1912, and included reference to Mr. Williams.

* * *

A PRESENTATION was recently made to Mr. Arthur Watson, C.B.E., General Manager, Lancashire and Yorkshire Railway, by the staff of the office of the Superintendent of the Line, as a tribute of respect and esteem to their late chief on his appointment to the chief executive position. The ceremony was unique in the sense that it marked the first occasion on this railway where the General Manager has arisen from the passenger section. Mr. Watson, in accepting the present, which consisted of a gold pen and pencil combined for himself, and a pair of diamond earrings for Mrs. Watson, thanked his late staff very heartily for their generous thought which he thoroughly appreciated.

* * *

IT is with great regret we have to record the death of Mr. W. E. Blake, Superintendent of the Line, Metropolitan District, London Electric, Central London, and City and South London Railways. "District-bred," having served the whole of his railway career on that line, Mr. Blake had achieved a special reputation for ingenious train-working under most difficult conditions, and before the war introduced its many difficulties, had raised Underground train-working to a fine art, so that 44 trains per hour on each line were operated on the District system punctually and regularly at busy periods, with corresponding results on other lines under his direction. He was most popular with the staff of all grades, and was highly esteemed by all who had to deal with

THE LATE MR. W. E. BLAKE,
Superintendent of the Line, Metropolitan District Railway and Allied Tubes, 1915–19.

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him—officially and personally. Mr. Blake entered the service of the Metropolitan District Railway in 1887, at the age of 14, as a junior clerk in the Outside Traffic Department. After experiences in charge of one of the stations, he was transferred to the General Offices, first as Staff and then as Time-table Clerk. In connection with the changes prior to the electrification of the railway, he was appointed to his chief position, so that most of the traffic developments associated with electric operation have been carried out under his control.

* * *

A PLEASANT little ceremony took place in the board room of the Lancashire and Yorkshire Railway at Hunt's Bank, Manchester, on Friday, May 2, presentations being made by Mr. Arthur Watson, General Manager, on behalf of the officers of the Lancashire and Yorkshire Railway, to four of their colleagues who were retiring after long service with the railway company, viz., Mr. James Waring, Chief Storekeeper; Mr. William Slater, Deputy Assistant Chief Goods Manager; Mr. L. Franklin, Resident Engineer, Fleetwood, and Mr. James Nuttall, Assistant to the Secretary.

* * *

MR. DAVID PRYKE has recently retired from the head office staff of the Metropolitan District and Underground Railways after 35 years' service. The esteem in which Mr. Pryke was held was marked by the presentation to him of a gold watch and silver cigarette case at a farewell gathering presided over by the Passenger Agent, Mr. S. J. Webb.

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THE directors of the Great Southern of Spain Railway, in their latest annual report, state that they desire to express their "cordial acknowledgments of the services rendered in circumstances of exceptional difficulty by the general manager (Mr. George L. Boag), secretary (Mr. A. F. Judd), officers and staff, and of the continued goodwill of the men engaged in carrying on the railway and shipping operations of the company."

* * *

MR. CECIL F. GRASEMAN presided at the Annual General Meeting of the London and North Western (London) Athletic Club recently when, in view of the return of a large number of members from the war, it was decided to revive as far as possible pre-war activities of the club. Full season's fixtures have been arranged for the various sections, and the usual Annual Sports will be held on the Club Grounds at Wembley on June 14th next. The sports will be known and remembered as the Victory Sports, and will include special features including, it is hoped, a Victory Pageant interspersed with dances to be arranged by members of the Operatic Section of the Club.

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THE "Cornish Riviera" express, Great Western Railway, again leaves at 10.30 a.m., replacing its war-time substitute, the 10.15 a.m., and is non-stop to Exeter, slipping a coach at Taunton for Ilfracombe and the North Somerset line. To serve Westbury, Yeovil and Weymouth a new train is provided at 9.30 a.m. Other services for the West of England include a new express at 11.30 a.m. for Torquay, South Devon, Newquay and Cornwall. A similar express is provided as 1.45 p.m., Plymouth being reached at 7.5. p.m. and Penzance at 10.15 p.m. In the opposite direction the 8.30 a.m. from Plymouth is accelerated to reach Paddington at 1.45 p.m. instead of 2.25 p.m., and a train leaves Torquay at 11.45 a.m., reaching Paddington at 4.15 p.m. The former popular 9.10 a.m. train from Bristol, due at Paddington 11.35 a.m., is restored. On the South Wales route the Fishguard express from Paddington at 8.45 a.m. reappears, and is due Newport 11.25 a.m. and Cardiff 11.47 a.m. The 3 p.m. leaves at 3.20 p.m., reaching Newport 6.9. p.m. and Cardiff 6.40 p.m. (respectively 7 and 9 min. later than formerly). The 10 a.m. Cardiff-London and 6 p.m. Paddington-Cardiff expresses again include restaurant cars. Between Gloucester, Newport and Cardiff several new trains are added and various others accelerated, and additional connections given. A new train from Cardiff at 11.45 a.m. for Bristol conveys through coaches for Torquay, Newquay and Penzance. The return train leaves Plymouth at 10.35 a.m. and Bristol at 2.25 p.m. for Newport and Cardiff. On the West-to-North route a new train is provided from Cardiff at 9.28 a.m. for Crewe, Manchester and Birkenhead, while a return service leaving Crewe at 1.20 p.m. will connect at Pontypool Road with the present 4.40 p.m. train thence to Cardiff, due 5.37 p.m. On the Birmingham route a new express is provided at 3.30 p.m. for Leamington, Birmingham, Shrewsbury, &c. The 10.30 a.m. is altered to leave at 10.15 a.m.

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A NEW morning business express train leaves Shrewsbury at 9 a.m. and Birmingham 10.20 a.m., due Paddington 12.50 p.m. The 9.50 a.m. from Paddington to Worcester and the West Midland District is altered to 9.45 a.m., and is accelerated,

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as is also the 4.45 p.m., and return trains leaving Worcester at 2 and 5.45 p.m. The 10.45 a.m. from Paddington to the Swindon-Gloucester line is altered to 10.10 a.m. Restaurant cars are provided on the 10.30 a.m. down; 5.30 p.m. for Birmingham and the North; 6 p.m. to Gloucester and Cheltenham; 6.30 p.m. to Bristol; 9.45 a.m. from Penzance; 10 a.m. from Cardiff; 11.50 a.m. from Wolverhampton, and 12 noon from Bristol to Paddington. Through cross-country services are also revived between Birkenhead and Bournemouth, via Oxford and Basingstoke, in conjunction with the London and South Western Railway. A large number of additional local trains have been arranged on various sections, and the branch line services augmented. The following stations have been re-opened: Dawlish Warren, Ide, Teingrace, Pontnewydd and Manod.

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RESTAURANT cars are now provided by the London and North Western Railway on the following additional trains from London: 8.10 a.m. Holyhead, 9 a.m. Birmingham, 9.15 Carlisle, 11 a.m. Liverpool, a new 11.30 a.m. for Birmingham and Wolverhampton, 1.20 p.m. Birmingham, 5.20 p.m. Liverpool (slightly accelerated), 5.30 p.m. Manchester. Many additional suburban facilities are provided also in the Manchester and Liverpool district, and improved connections between the West of England and the North are given via Birmingham and via Crewe. Further connections are also given on services from Birmingham, Liverpool, Manchester, &c., to the North, and in some cases restaurant cars are now supplied.

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PRINCIPAL Great Northern Railway alterations from May 5 include the restoration of the breakfast car train from Leeds at 7.50 a.m., due King's Cross 12.10 p.m. The 9.20 a.m. from Leeds leaves at 9.35 a.m. and is due in London at 1.55 p.m.; while the 2.55 p.m. is altered to 3.30 p.m., reaching King's Cross 7.50 p.m. Through carriages for Hull are attached to the 1.30 p.m. luncheon car express from King's Cross. An additional train leaves King's Cross at 3 p.m. for Hitchin and Peterborough, giving connections to Cambridge and Lincolnshire district, and conveying a through carriage to Cromer. The 7 a.m. ex Leeds is retimed from Doncaster; the 9.54 a.m. from York and the 2.55 p.m. from Leeds are also altered somewhat. The 5.20 p.m. ex York runs forward from Doncaster to King's Cross, due 9.55 p.m., independently of the Leeds train, and is provided with restaurant cars.

MANY important train alterations were brought into effect on May 1 by the London, Brighton and South Coast Railway. Principal new services on week-days are:—11 a.m. and 7.15 p.m. Victoria to Brighton (with connections from Brighton to Worthing); 8.9 a.m. (Mondays only) and 1.20 p.m., Brighton to Victoria; 6.53 a.m., West Worthing to London Bridge; 2.10 p.m., West Worthing to Victoria; 2 p.m., London Bridge to Eastbourne and Hastings; 2.8 p.m., Hastings to London Bridge and Victoria; 11.35 a.m., Victoria to Portsmouth Harbour and Ryde; 10.55 a.m., Portsmouth Harbour to Victoria. On Sundays the following new trains may be noted:—1.10 and 9.25 p.m., Victoria to Brighton; 12.30 and 5.40 p.m., Brighton to Victoria; 8.40 a.m., Victoria to Littlehampton and Bognor; 9.55 a.m., Victoria to Portsmouth Harbour; 5.45 p.m., Portsmouth Harbour to Victoria; 6 p.m., Bognor to Littlehampton and Victoria. Various other trains are accelerated and altered, and many detail changes made. Numerous alterations on suburban and coastal lines are also included. Selsdon Road and South Bermondsey stations have been re-opened for traffic.

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COMMENCING June 2 several important alterations will come into force affecting the East Coast Route between London and Scotland. A new midday express will leave King's Cross at 1.20 p.m., due at Waverley 10.20 p.m., while the return train leaves Edinburgh at 12.30 p.m., reaching London at 9.30 p.m. Both include luncheon and dining cars. On the North Eastern section a new train leaves Newcastle for York at 7.42 a.m., calling at Darlington and Thirsk; the 9.35 a.m. Newcastle to Edinburgh ceases to call at Drem; luncheon cars will be attached to the 12.25 p.m. Newcastle to York, and 6.25 p.m. York to Newcastle; an additional train leaves Newcastle for York at 2.50 p.m.; the 1.40 p.m. from London ceases to be a train for Newcastle but has through coaches for Scarborough, and the 3 p.m. Newcastle to London is discontinued, as also the 6.8 p.m. York to Newcastle. A number of other alterations are included, and in several instances local services are entirely revised. Additional expresses are provided between Leeds and Harrogate, York and Scarborough, Hull and Scarborough, and on the Leeds-Stockton-West Hartlepool route, &c.

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ON the Lancashire and Yorkshire Railway the 6.15 a.m. Fleetwood to Leeds and Bradford train (from Manchester only on

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Mondays) is again provided with restaurant-car accommodation. The 10.40 a.m. express Liverpool to York, and the 4.35 p.m. Liverpool to Leeds and Bradford also now include restaurant cars. A new train leaves Manchester at 5.10 p.m. for York, following the 4.50 p.m., altered to leave at 4.37 p.m., giving much improved connections from Manchester. Return restaurant-car services are 1.2 p.m. from Leeds and 7.5 p.m. from York to Liverpool, and the Belfast boat train leaving Leeds at 7.15 p.m. The 2.40 p.m. from York to Manchester is again non-stop from Wakefield to Manchester, except for a conditional call at Todmorden. Numerous through trains from various towns to Blackpool, as also to Southport, are scheduled to run on certain days, or within specified periods to meet the demands of the heavy season holiday traffic. Numerous detail improvements are also included.

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A NEW Leeds and Bradford express, leaving St. Pancras at 3.10 p.m. and calling at Kettering, Nottingham, Chesterfield and Sheffield, was added by the Midland Railway from May 5. The 9.40 a.m. London to Manchester train stops at Cheadle Heath at 2.40 p.m. to set down passengers. The 12.20 p.m. Carlisle to London now calls daily at Hellifield.

* * *

On and from Monday, May 5, the Metropolitan Railway service on the St. John's Wood Extension line has been increased between the hours of 10 a.m. and 4 p.m. A five-minutes' service is run to and from Baker Street and Willesden Green, a 15-min. service to and from Baker Street and Wembley Park and Harrow, and a service to and from Baker Street and Uxbridge each half-hour, in addition to which there are two additional trains to and from Baker Street and Neasden each hour. For the convenience of evening passengers, an extra non-stop train leaves Baker Street for Willesden Green and Harrow at 5.4 p.m.

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LONDON AND NORTH WESTERN and North London electric train services via the Hampstead Junction line were accelerated and improved as from Monday, May 5. Richmond trains cease to call regularly at Canonbury and Barnsbury, and a half-hourly service of through trains added between Broad Street and Kew Bridge throughout the day, in place of the locals between Kew Bridge and Acton, combining to produce a 15-minute service between Broad Street and Acton via Hampstead Heath. Additional fast trains leave Broad Street for Richmond in the evening, and additional through trains run between Broad Street and Kew Bridge in each direction on Sunday afternoon and evening. On the Broad Street, Bow and Poplar line further local trains run between Broad Street and Bow morning and evening. A half-hourly service is provided between Broad Street and Poplar in each direction on Sunday afternoon and evening.

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THE up-river services of the Metropolitan District Railway have been augmented by three additional Sunday trains from Hammersmith to Kew and Richmond between 3 p.m., and 4 p.m. and four extra trains returning from Richmond (with City connections) between 9 p.m. and 10.15 p.m. Weekday services on several routes have been greatly improved. An additional through train is run on the Ealing-Southend route, leaving Ealing at 8.5. a.m. and returning from Southend at 8.5 p.m. There are now three through trains per day on this route. Trains from Charing Cross to Golders Green and Charing Cross to Highgate have been increased to a five-minute service, thereby providing a train every 2½ minutes between Charing Cross and Camden Town. This applies between 10 a.m. and 1 p.m. To relieve the pressure of theatre traffic three additional trains are run between 11 and 11.30 p.m. to and from Elephant & Castle and Queen's Park. On Saturdays only trains hitherto terminating at Paddington between 5 and 9 p.m. now continue their journey to Queen's Park. The 15-minute service between Elephant & Castle and Watford was reinstated on May 5.

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Nos. 57, 504, 974, 1673 and 2184 are new London and North Western engines of the 4-6-0 "Prince of Wales" class, recently completed at Crewe. They belong to the batch referred to on page 280 of the April issue. A further series of the same type will shortly be put in hand. Recent withdrawals include No. 504, 5-ft. compound goods. Only three of this class now remain, viz.: Nos. 1113, 1407 and 2059. No. 3404, one of the 0-6-0 coal engines recently returned from overseas, has been renumbered 2437. Recent changes in the stations of the "Claughton" class locomotives are 154-15 and 1019-26. The latter takes the place of 986, which has gone into the works.

* * *

IN reply to several RAILWAY MAGAZINE readers, who have asked for information concerning "Precursor" class locomotives on the London and North Western Railway, which are fitted with superheaters, Mr. C. Williams of Crewe states that there are now 36 of these engines running, of which 27 are

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rebuilt with extended smokeboxes. These latter are Nos. 7, 60, 106, 300, 301, 310, 333, 365, 366, 513, 515, 564, 643, 659, 1137, 1363, 1395, 1419, 1469, 1573, 1617, 1723, 2011, 2062, 2164, 2166 and 2513. The remainder, which were superheated without external alteration, are Nos. 302, 303, 323, 469, 688, 802, 1309, 1439 and 2064. The rebuilt engines have piston valves and the others slide valves. No. 7 was the first of the class to be rebuilt with superheater, while No. 513 was originally superheated without alteration. No. 974, *Richard Cobden*, a 6 ft. 6 in. "Jumbo," has been withdrawn. No. 304 *Hector*, of the same class, is in service again, and not scrapped, as has been stated.

* * *

TWELVE inquiries have been held by the Inspecting Officers of the Board of Trade concerning railway accidents during last year, seven in the first half and five in the second. Four were fatal cases—the collision at Parkhall, derailment near Little Salkeld, and collisions at Aberdeen and Bamfurlong; the first and last were not passenger train accidents. Of the total of 12, four were passenger train collisions, five were goods train collisions, two were passenger train derailments, and one was a goods train getting out of control and being derailed. Of the four passenger train collisions, one was alleged to be due to the driver, two to signalmen, and one to a broken coupling. Of the five goods train collisions four were described as due to irregularities by signalmen; the cause of the fifth was not cleared up—it might have been an irregularity by signalmen or a failure of the signalling apparatus. One of the passenger train derailments was due to the train running into a landslip and the other to defective permanent way.

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LANCASHIRE AND YORKSHIRE RAILWAY stations recently reopened for traffic include Bowling Junction, Daisy Field, Dicconson Lane, Hilton House, and Northorpe.

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LONDON AND NORTH WESTERN RAILWAY stations closed for the war period were opened on May 5, as follows:—*For passenger train traffic:* Church Brampton, Halebank, Garston Dock, Garston Church Road, Gildersome, Llong, Mochdre and Pabo, Nantlle, Staincliffe and Batley Carr. *For passengers only:* Carpenders Park, Aspley Guise, Bow Brickhill, Husborne Crawley, Kempston Hardwick, Kempston and Elstow, Wootton Pillinge, Wootton Broadmead, Port Meadow, Charlton, Oddington, Wolvercote, Wendlebury, and Oxford Road.

AMBULANCE traffic at Southampton Docks, London and South Western Railway, involved some notable achievements. One of the special periods of stress occurred after the Battle of the Somme. During seven days ended July 9, 1916, no less than 155 ambulance trains left Southampton Docks. The heaviest day was July 7, when 30 trains departed. The area covered extended from Plymouth to Aberdeen; 13 ambulance trains, 9 emergency corridor trains, 24 separate corridor carriages and 16 vans were utilised. During the year 1916 over 300,000 sick and wounded were landed at Southampton, and the approximate mileage covered by the trains was 740,000.

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COMMENCING May 5, Coborn Road, Shadwell and Cambridge Heath Stations, Great Eastern Railway, closed during the war period, were reopened for passenger traffic.

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THE directors of the Furness Railway Company have decided to discard painting the upper portions of their carriages white, adopting in future the uniform colour of royal blue. New coaches at present being built in the works at Barrow will, therefore, be painted in this way, as will all other stock as it passes through the works. The coaches, when so painted, have a very pleasing appearance, and the cost of maintenance will be rather cheaper than it is under the present two-colour system.

* * *

A MEETING of the Institution of Locomotive Engineers was held at Caxton Hall, Westminster, on Saturday, April 12, Mr. B. K. Field, Vice-President, in the Chair. A paper by Mr. P. C. Dewhurst, Member, Jamaica, was read by Mr. G. F. Burtt, Secretary, on "Steel Fireboxes and Tubes in Locomotive Boilers." The same paper was also presented to the Leeds Centre of the Institution at their meeting in the Philosophical Hall, Park Row, Leeds, on Tuesday, April 29, Colonel Kitson Clark being in the chair. The paper was read, in Mr. Dewhurst's absence, by Mr. A. T. Houldcroft, the Local Honorary Secretary. The paper gave results of practical experience with steel fireboxes and steel and iron tubes on the railway with which the author is connected. This railway, on account of its having been under English and American ownership at different times, and also on account of its geographical location, has had for many years a mixture of English and American locomotives, materials and methods, giving a probably unique position from which to view the two systems of locomotive practice. Mr. Dewhurst dealt

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with the history of steel fireboxes, and the paper included a number of figures illustrating various designs of fireboxes which have been in use from time to time. He also considered extensively leakages in steel fireboxes and detailed methods of patching used to overcome these troubles. The methods employed in fitting steel fireboxes and tubes were given, together with particulars of the means adopted to ensure efficiency in service, adequate maintenance and repair. At both meetings interesting discussions followed. In London speakers included Messrs. B. K. Field, W. Smith-Mannering, W. A. Lelean, J. Riekie, and others. At Leeds speakers were: Col. Kitson Clark, Messrs. Gilling, Kidd, Connell, Paterson, Hird, Elliott, Hinds, Laine, Alcock and Houldcroft.

* * *

A MEETING of the Institution of Locomotive Engineers, inaugurating a Local Centre at Manchester, was held recently at the Municipal School of Technology, Sackville Street, Manchester. Mr. George Hughes, Chief Mechanical Engineer, Lancashire and Yorkshire Railway, was elected to the chair, and announced that he had received expressions of regret from Mr. C. J. Bowen Cooke, C.B.E., and Colonel Kitson Clark on account of their inability to be present at the meeting. The proceedings were of a more or less formal character, consisting of the election of a Chairman and Vice-Chairman, and also of a local Committee. Mr. Attock, of the Lancashire and Yorkshire Railway, accepted the position of Chairman, and Mr. J. W. Smith, of the Great Central Railway Locomotive Department, that of Vice-Chairman. Mr. Hughes proposed that the provisional committee appointed to deal with the formation of the Manchester Centre should be now elected as a permanent Committee, the following gentlemen beng concerned :—Messrs. D. C. Fletcher and G. H. Jackson (Great Northern Railway), A. C. Kiffin (Beyer, Peacock and Co.), H. M. Lipscomb (Midland Railway), J. McLay (Vulcan Foundry), T. Lawrence (London and North Western Railway, Crewe), E. F. Lang (Beyer, Peacock and Co.), R. G. McLaughlin (Lancashire and Yorkshire Railway), D. R. Edge (Great Central Railway), and W. Rowland (Great Central Railway). The President of the Institution, Mr. Ryan, also addressed the meeting briefly, as did Mr. G. F. Burtt, the General Hon. Secretary, and Mr. Houldcroft, Secretary of the Leeds Centre. Mr. Hurt will act as Secretary of the Manchester Centre.

* * *

IN view of many enquiries concerning trains operated by the Great Western Railway 4-6-2 engine No. 111, *The Great Bear*, it may be mentioned that recently and for several weeks it was frequently—almost daily—employed to work the 5.30 a.m. newspaper and mail train from Paddington to Bristol, due 8.31 ; returning on the 9.40 a.m. ex Bristol, reaching London at 12.40.

* * *

"SOME Post-War Travel Suggestions" formed the subject of Mr. Cecil J. Allen's paper read at the Railway Club meeting on Tuesday, May 6th. In the main Mr. Allen dealt with suggestions already indicated in his articles on "British Locomotive Practice and Performance," particularly in regard to suggested high-speed special fare trains; but he also considered various other aspects, notably in regard to the working of restaurant cars. An interesting discussion followed. At the meeting on June 3rd, Rev. W. J. Scott, B.A., Past-President, will deal with "Train Services in 1852." The annual dinner, held on Friday, May 9th, at the Holborn Restaurant, Mr. W. Parker, President, in the chair, effectively carried on the successful series of such functions interrupted by the war. There was a good attendance, and the dinner formed a reunion of a most enjoyable character. Mr. Basil Mercer was responsible for arranging a successful musical programme.

* * *

As tangible evidence that post-war trade is beginning to manifest itself the following recent orders for locomotives and rolling-stock may be mentioned :—North Eastern Railway, with Armstrong, Whitworth & Co., Ltd., for 50 goods engines, T2 type; Great Eastern Railway, with Wm. Beardmore and Co., Ltd., Dalmuir, for 20 express engines and tenders, 4-6-0 type, and with the Midland Railway Carriage and Wagon Company, Ltd., for 40 bogie carriages ; Oudh and Rohilkhand State Railway, with Armstrong, Whitworth and Co., Ltd., for 23 engines, 0-6-0 type (broad gauge) ; Eastern Bengal State Railways, with the Hunslet Engine Company, Ltd., for 26 engines (metre gauge) ; Great Indian Peninsula Railway, with the Patent Shaft and Axletree Company for 1,592 pairs of wheels and axles (broad gauge) ; Eastern Bengal State Railways, with the Leeds Forge Company, Ltd., for 10 bogie rail and bolster trucks (broad gauge) ; Jodhpur Bikanir Railway, with Harrison and Camm, Rotherham, for 400 pairs of wheels and axles (metre gauge) ; South Indian Railway, with the Patent Shaft and Axletree Company for 106 pairs of wheels and axles (broad gauge) and 546 pairs (metre gauge) ; Assam Bengal Railway, with the Newlay Wheel Company, Ltd., for 200 pairs of wheels and axles (metre gauge) ; South

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African Railways, with the Baldwin Locomotive Works for 30 engines: Burma Railways with the Leeds Forge Company, Ltd., for 38 bogie hopper wagons and 36 bogie ballast wagons (metre gauge); Great Indian Peninsula Railway, with the Birmingham Railway Carriage and Wagon Company, Ltd., for 500 pairs of wheels and axles (broad gauge); and Bengal Nagpur Railway Company, with the Midland Railway Carriage and Wagon Company, Ltd., for 50 bogie rail wagons and 40 bogie coal hopper wagons.

* * *

FOR a health-giving holiday the Norfolk Broads provide a plethora of pleasure places that compare favourably with any other district in England, and it is anticipated that during the present summer a very large number of Londoners and others will avail themselves of the advantages offered by the Norfolk Broads Yachting Company, Limited, 5, Bank Plain, Norwich. Less than three hours railway journey by the Great Eastern from London and the would-be yachtsman is landed in the heart of Broadland, where yachts, pleasure wherries, motor boats, and small sailing and rowing boats may be hired for long or short periods at reasonable charges. One of the principal depôts of the company is at Wroxham, a centre directly served by Great Eastern main-line trains. Full particulars will be supplied RAILWAY MAGAZINE readers on application to the secretary, Mr. F. S. Culley, at the address mentioned.

* * *

THE outstanding feature of the Lyons Exhibition—The Lyons Fair of 1919—was the Canadian Section of 72 booths, and the most popular exhibit was that of the Canadian Pacific Railway. An interesting souvenir has been issued by the C.P.R. from their London offices, 62-65, Charing Cross, S.W. 1, giving particulars of the various exhibits, also views in the section.

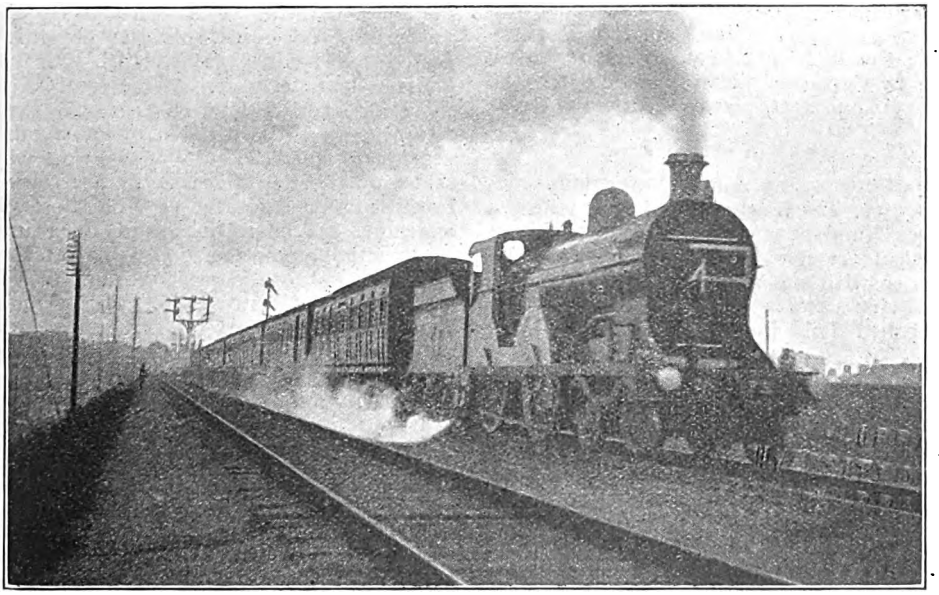

Photo.] [*K.A.C.R. Nunn.*

GREAT NORTHERN RAILWAY (IRELAND).

Dublin—Belfast Express near Amiens Street (Dublin) Station. Superheater 4-4-0 engine No. 173 "Galteemore."

Exhibitions of films were shown at the Conservatoire, Quai de Bondy, for which free admission tickets were given from stalls in the Canadian section, and a splendid selection supplied from the London and Montreal offices of the C.P.R. were most popular. Stands Nos. 15 to 22 were occupied by the Canadian Pacific Railway under the direction of Mr. E. R. Bruce, Exhibition Manager. In addition to Mr. Bruce, the company was represented by Mr. Catoni, Paris representative, Mr. E. C. Gill, London, and Lieut. Norman S. Rankin, who in civil life is Publicity Agent for the Canadian Pacific Department of Natural Resources, Calgary. Interior of the booths, tastefully decorated

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with wheat, grasses, and heads, and enlarged photos framed in natural wood, was divided into five sections. In the centre of the first compartment was a large illuminated map of Canada, surrounded by 18 transparencies. In the front of this and the other booths were transparencies depicting activities of the company on the Atlantic and Pacific Oceans and in Canada, with scenes along its route. The second division contained a panorama of Fort William, showing moving trains, steamers, and boats with elevators loading and unloading grain both by day and night. In the third section, Quebec, with the Chateau Frontenac and moving boats and steamers on the river below, was to be observed by day and by night. The fourth compartment contained a long and beautiful moving panorama of the Canadian Rockies, whilst the fifth had been fitted up as an office in Canadian natural woods, for the issue of pamphlets, picture postcards, &c.

* * *

OUR enterprising South Wales daily contemporary, *The Western Mail*, has issued a Jubilee Number. A special feature is an historical review by Sir Emsley Carr, together with an appreciation of the late Mr. Henry Lascelles Carr, "the man who established daily journalism in Wales."

* * *

MR. C. HUDDLESTON mentions that the line shown on the map reproduced on page 288 last month, in connection with the article on the East Kent Railway, just east of Minster Station, connecting the Canterbury-Ramsgate and Deal and Dover lines, no longer exists, rails and sleepers having been taken up some time ago, presumably for war purposes, though the loop has been very little used, as most of the traffic passes along the other two sides of the triangle thus constituted.

* * *

MR. J. G. GALER, now serving with the Royal Engineers, mentions that at Staines, London and South Western Railway, the triangle is controlled by one signal cabin (power operated), and asks whether readers can specify any other similar instances. He also refers to the working of Great Northern 0-6-0 engines on the London and South Western Railway, specifying Nos. 150A, 162, 304, 312, 1087 and 1131. These have been fitted with lamp brackets to carry London and South Western head-codes. Among foreign engines working through Staines he mentions: Midland 4-4-2 tanks (L.T. and S. section); Great Eastern 0-6-0's, and Great Northern and London and North Western 0-6-0's.

THE annual report of the Queensland Commissioner for Railways shows that 5,438 miles of railways are open to traffic. Revenue for the last financial year, exclusive of the Etheridge line, which is 142 miles in length, was £4,023,921, being an increase on the revenue of the previous year of £191,954. Working expenses amount to £3,410,157, an increase of £415,970, leaving a net revenue of only £613,764. The Commissioner, in referring to these results, says: Notwithstanding that the gross receipts for the year were £4,023,921, exclusive of the Etheridge line, the largest revenue ever earned by our railways, the net revenue, after paying working expenses, was only £613,764, being £224,016 below the net revenue for the previous financial year. This is equal to £1 9s. 7d., per cent. on the capital invested, as against £2 1s. 6¼d. per cent. for last financial year. While receipts only show an improvement of £191,954, expenditure, compared with that of last financial year, was increased by £415,970, which accounts for the decrease in net revenue. Interest charged for the year on the capital expended on open lines and lines under construction amounted to £1,639,210; therefore, the result of the year's working discloses a shortage of £1,025,446. The Commissioner points out that the strictest economy was observed, resulting in a saving of £60,481 otherwise the increase in expenditure would have been £476,451.

* * *

NEW locomotive orders recently placed include the following: Burma Railways, with Nasmyth, Wilson and Co., Limited, for 17 engines, 4-6-0 type (metre gauge). North Eastern Railway, with Armstrong, Whitworth and Co., Limited, for 20 goods engines. The Crown Agents for the Colonies are considering tenders for four superheated passenger engines, 4-6-0 type, for the Trinidad Railways.

* * *

VACANCIES on the West African Railway Government Railways are announced by the Crown Agents for the Colonies, 4, Millbank, London, S.W. 1. The staff required includes traffic inspectors, fitters, boilermakers, locomotive drivers, guards, and platelayers. Salaries range from £200 a year upwards. Free quarters and passages are provided. Leave on full salary is arranged and a war bonus granted men with dependents. Applicants in writing the Crown Agents at the address given, should state their position in regard to military service, and should mention the RAILWAY MAGAZINE.

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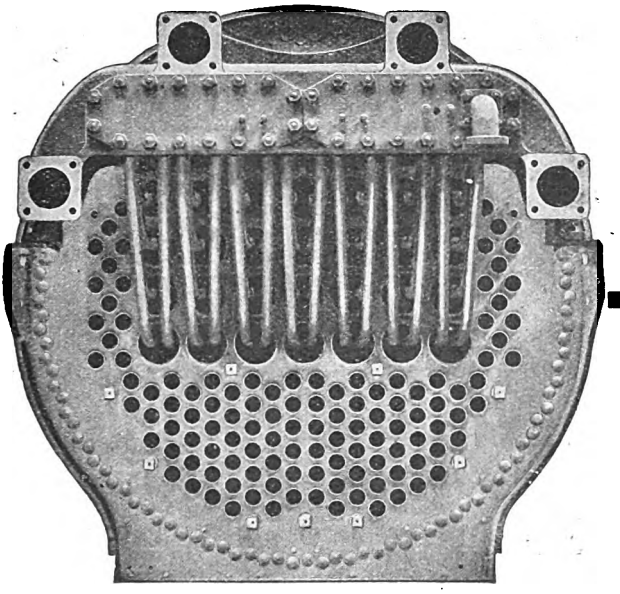

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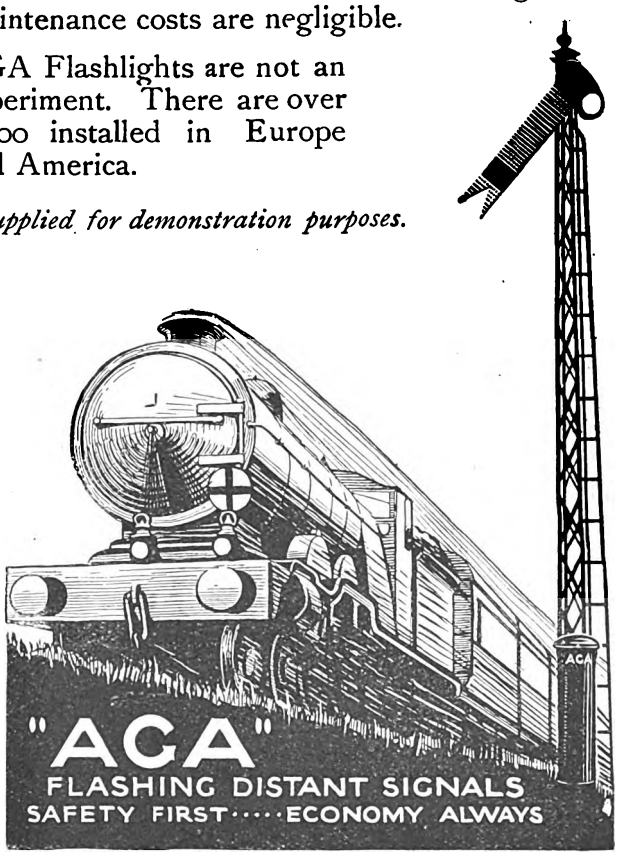

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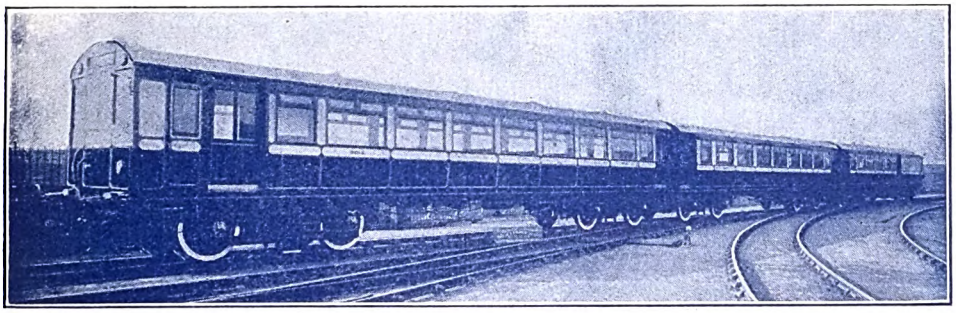

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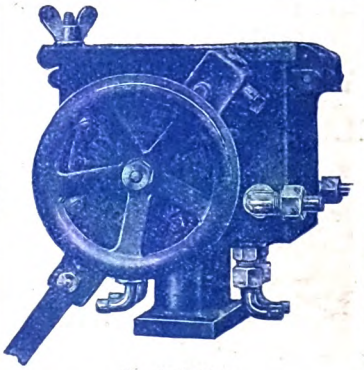

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